

TECHNICAL REPORT

of the

[REDACTED] PIPE RIGGING & LIFTING INCIDENT

By:

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February 18, 2011

Robson Forensic
Engineers, Architects, Scientists & Fire Investigators

**INVESTIGATION OF THE [REDACTED] PIPE RIGGING & LIFTING
INCIDENT**

TECHNICAL REPORT

FEBRUARY 18, 2011

A. INTRODUCTION

On August 30, 2007, [REDACTED] was employed as a laborer by [REDACTED], Inc. Mr. [REDACTED] was part of a crew that was unloading pipe from a flatbed trailer on a project located in [REDACTED], WV. During the lifting process, Mr. [REDACTED] was either knocked off the trailer bed by moving pipe or fell from the trailer bed and was injured when he was struck by a pipe that had become loose on the trailer bed and rolled off the trailer and onto Mr. [REDACTED].

The purpose of my investigation was to determine if the actions of any party associated with the pipeline construction project were unsafe or inappropriate in a manner that was a cause of the incident that injured Mr. [REDACTED] and if the actions of [REDACTED] would satisfy the five requirements of a "Mandolidis" Action.

B. INFORMATION AVAILABLE

1. The Complaint.
2. Defendant [REDACTED], Inc.'s Responses to Plaintiff's First Set of Interrogatories and Requests for Production of Documents to Defendant.
3. Plaintiff's Objections, Answers and Responses to Defendant's First Set of Interrogatories and Requests for Production of Documents.
4. Depositions of [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED] and Dr. [REDACTED].
5. Twenty one (21) color copies of Photos on equipment involved in this litigation. Master Service Agreement Between [REDACTED] Services ([REDACTED]) and [REDACTED] Services, Inc. ([REDACTED]).
6. Dr. [REDACTED] Report dated October 20, 2010.

C. BACKGROUND AND INCIDENT DETAILS

1. Background

The project owner was [REDACTED]. The project consisted of replacing an existing gas line with new 4-inch diameter steel piping. The project was located in [REDACTED], WV. [REDACTED] had been hired by [REDACTED] to install the pipeline.

It is understood that the work on this project had been underway for only two days at the time of the incident. It is further understood that [REDACTED] had been employed by [REDACTED] for a period of one to one and a half months prior to the incident. At the time of the incident, Mr. [REDACTED] was still considered a new employee. The first day on the project and for the morning on the day of the incident, the [REDACTED] crew had been clearing and grubbing the right of way on which the gas pipe line was to be installed.

Key [REDACTED] personnel include: [REDACTED] (operations manager), [REDACTED] (superintendent and operator), [REDACTED] (equipment operator), [REDACTED] (laborer), [REDACTED] (operator in training) and [REDACTED] (laborer).

A flatbed trailer with two rows of pipe had been driven to the site on the first day and left there. According to the testimony the bottom row was supported by three pieces of dunnage, one at each end and one in the middle. At the end of each piece of dunnage, there was a wood block that was fastened to the dunnage to hold and secure the bottom row of pipe in place. The second row was nested into the first row ... that is the pipe in the second row was placed between the two pieces on the first row. This meant that the top or second row had one less pieces of pipe in it than the bottom row. The pipe was 4-inches in diameter and 42 feet long. Each piece weighed approximately 300 pounds.

[REDACTED] was a non-union company, meaning that workers were hired individually.

On the first day at this work site, the entire crew worked on clearing and grubbing the right of way. The next morning, most of the crew worked on clearing and grubbing while [REDACTED] used an excavator to excavate the pipe trench over a portion of the right of way that had already been cleared.

2. Incident Details

Near late morning or about noon time, [REDACTED] directed both [REDACTED] and [REDACTED] to unload pipe from the trailer and to string the pipe along the excavated trench. Mr. [REDACTED] stated that he instructed the two workers how to perform the work and included in his directions the intent to lift three pieces of pipe at one time. Mr. [REDACTED] said the instruction session was mostly for [REDACTED]

since he was a fairly new employee. Mr. [REDACTED] also said there was a clevis or shackle connected to the lifting lug that was welded to the excavator bucket.

[REDACTED] operated a Kotmatsu mini-excavator to unload the pipe. He said the equipment was likely rated to handle much more than three pieces of pipe but that he felt three pieces was reasonable and easy for a man to balance when the rigging was misaligned from the center of the pipe.

There are two basic accounts of how the incident occurred. Neither account specifically identifies a reason for the incident occurrence. Both accounts will be described, followed by my opinions on how the incident likely occurred.

[REDACTED] Version

In the version of the incident related by Mr. [REDACTED], he said that he had never unloaded pipe before and asked [REDACTED] to help him on the trailer. He said they positioned one end of a nylon sling under three pieces of pipe. He said he questioned Mr. [REDACTED] about the safety of lifting three pieces of pipe at one time and was assured by Mr. [REDACTED] that lifting in this manner was safe. After the sling was passed under the pipe (Mr. [REDACTED] picked up one end of the pipe so Mr. [REDACTED] could slide the sling under it before setting the end of pipe back down) and placed in a choker-hitch configuration around the pipe, the other end was attached to the excavator bucket. Mr. [REDACTED] stated that he thought the end of the sling had been attached to a tooth on the excavator bucket.

Mr. [REDACTED] stated that he then started walking toward the front of the trailer so that he could stand at the end of the pipe and guide the pipe bundle as it was being lifted. He said he then heard a noise that sounded like wind chimes and was then knocked off the bed of the trailer. The next thing he knew was that he was laying on the ground and heard Mr. [REDACTED] saying don't move, we will get the pipe off your legs. Mr. [REDACTED] helped him sit up and then went to get [REDACTED]. Mr. [REDACTED] has no recollection of a neighbor showing up at the incident scene and giving Mr. [REDACTED] a ride to where Mr. [REDACTED] was located on the job. After a period of about 30 minutes, the swelling on Mr. [REDACTED] leg increased and Mr. [REDACTED] directed another laborer, [REDACTED], to take Mr. [REDACTED] to the hospital. Mr. [REDACTED] was taken to the [REDACTED] hospital where he was admitted.

[REDACTED] Version

According to [REDACTED] deposition testimony, both Mr. [REDACTED] and Mr. [REDACTED] told him (right after the incident) that the pipe swung and struck Mr. [REDACTED] knocking him off the trailer. Neither Mr. [REDACTED] nor Mr. [REDACTED] mentioned that a pipe fell off the trailer and onto Mr. [REDACTED] legs.

██████████ Deposition Version

During his deposition, Mr. ██████████ provided another version of the incident. He said that after the sling was placed on the pipe and connected to the bucket, he then climbed back onto the excavator and waited for Mr. ██████████ to position himself at the front end of the trailer beyond the pipe stack. He said that he then concentrated on watching the pipe rise. He said he had the pipe lifted about 12 to 13 inches off the stack when he noticed one end (in my opinion the rear end) of the pipe drop down and strike the pipe that still lying on the stack. He said that when he looked toward Mr. ██████████, he saw him moving off the trailer bed. Mr. ██████████ said that while Mr. ██████████ was on the ground a piece of pipe that had not been part of the bundle he was lifting came loose, rolled off the trailer and fell onto Mr. ██████████ legs. Mr. ██████████ said he placed the pipe bundle he was lifting back on the bed of the trailer and verified that nothing else was moving. He then dismounted from the excavator and tended to Mr. ██████████. He said that after he got Mr. ██████████ settled down, he went to get ██████████. Mr. ██████████ also had no recollection of seeing a man that was on an ATV that picked up Mr. ██████████.

Mr. ██████████ said that after Mr. ██████████ had been transported to the hospital the pipe that had been lifted and set back down again was lifted and the pipe strung out without incident.

No investigation was performed into the incident. ██████████ said he notified Mr. ██████████ at the office of the incident on the day of the incident.

Likely Scenario of Events

Based on the testimony and my experience and training, I conclude the incident most likely occurred in the following manner. The sling was installed around the pipe in a location where it was closer to the front of the truck rather than the exact middle of the pipe. The sling attached to the excavator bucket was not vertical, but was out of plum with the top leaning toward the excavator. When the operator moved the bucket or boom to remove slack from the slack in the sling, he must have inadvertently continued the tensioning operation until all the slack was removed and tension in the sling began lifting the load. At this point, Mr. ██████████ had not quite reached the end of the pipe stack. Because the load line (sling) was not plum (vertical) and the sling location tended to lift the front end of the pipe ahead of the rear end of the pipe, the tension in the sling caused the front end of the pipe to rise up in the air and to also swing toward the side of the trailer bed and the excavator. This unexpected pipe movement caused the pipe to make contact with Mr. ██████████ and cause him to lose his balance and fall off the trailer bed.

The rear end of the pipe would have been in contact with the secured pipe of the first row. The vertical force, along with the prying action of the pipe swinging, caused the end pipe on the bottom row to be pried out of the blocking. Once the end of the pipe

was beyond the blocking, the force caused the pipe to come free and roll off the trailer bed.

This scenario explains how Mr. [REDACTED] was struck by the pipe and how the pipe became loose and was able to roll off the trailer bed even though it was properly blocked.

D. ANALYSIS

1. Construction Safety Standards

Construction safety standards are derived from a variety of sources. One source is OSHA. OSHA is not only a set of federal regulations that provide requirements for the construction environment, but it is also recognized as a minimum standard for safety in the construction industry.

CFR 29, Part 1926 of OSHA deals with construction activities. It is nationally recognized as a standard within the construction industry. It says:

It shall be the responsibility of the employer to initiate and maintain such programs (accident prevention) as may be necessary to comply with this part. 1926.20(b)(1)

The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposures to illness or injury. 1926.21(b)(2)

General. (1) All materials stored in tiers shall be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling or collapse. 1926.250(a)

Shackles and hooks. (1) Table H-19 shall be used to determine the safe working loads of various size shackles, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products, provided that a safety factor of not less than 5 is maintained. 1926.251(f)

Another source of safety standards comes from the American National Standards Institute (ANSI). It has issued standards on a wide variety of topics. ANSI Std. B30.9 on Slings states:

Hitch, Choker – Loading with sling passed through one end attachment, eye or handle and suspended by the other. 9.0.2.20

Slings with fittings which are used in a choker hitch shall be of sufficient length to assure that the choking action is on the webbing. 9.5.5.1.d

Slings used in a basket hitch shall have the load balanced to prevent slippage. 9.5.5.1.e

ANSI /ASME B30.5 STD on mobile and locomotive cranes (lifting devices) contains the following relevant to the issues in this case:

The load shall be attached to the hook by means of slings or other devices of sufficient capacity. 5-3.2.1.3(b)

The person directing the lift shall see that;

(2) the load is well secured and balanced in the sling or lifting device before it is lifted more than a few inches.

(3) The lift path is clear of obstructions 5-3.2.1.5(a)

Before starting to lift, the following conditions should be noted:

(3) The hook shall be brought over the load in such a manner as to minimize swinging. 5-3.2.1.5(b)

Yet another source of safety standards is provided by the issuance of manuals by nationally recognized organizations, such as The Associated General Contractors of America. The 8th Edition of their *Manual of Accident Prevention for Construction* contains two sections which are relevant to this case. Section 24 deals with Mobile Cranes, Derricks, and Tower Cranes. It states the following:

Slings should be adequate for the load being lifted and maintained in good condition. 24-2

Care should be taken to guard against injury to workers and other structures from swinging loads. 24-2

The hook should be directly over the load being lifted in order to minimize strain on the crane and sliding of the load. A shackle or moused hook should be used with swinging buckets. 24-2

Materials should be organized by type size and length. Materials should be placed in neat orderly piles that are protected from falling 25-1

Pipe should be stored on specially designed sills or racks and should be safely blocked to prevent rolling. 25-7

When removing pipe, work from the end of the pile as much as possible. 25-7

A widely regarded reference manual in the rigging field is the Rigging Manual issued by the Construction Safety Association of Ontario. It contains the following relevant information.

Single Choker Hitch (Fig. 6.8) forms a noose in the rope that tightens as the load is lifted. It does not provide full 360 degree contact with the load, however, and because of this it should not be used to lift loose bundles from which material can fall or loads that are difficult to balance. The single choker can be used doubled up (not to be confused with double choker hitch) as shown to provide the capacity or to turn a load. P.135

When using choker hitches, do not force the eye down towards the load once tension is applied. Rope damage is the invariable result. P. 176

All loads must be properly rigged to prevent the dislodgement of any part. Suspended loads should be securely slung and properly balances before they are set in motion. P. 176

The load line should be brought over the center of gravity of the load before the lift is started. P. 176

Make sure all personnel stand clear while loads are being lifted and lowered or while the slings are being drawn from beneath the load. P. 176

Construction safety standards applicable to this incident include:

- Informing employees of the hazards of their work environment and the precautions to eliminate or remove them.
- Ensuring the employees know what is expected of them.
- Not lifting loads until all personnel are clear from expected paths of load movement.
- Pipe be adequately secured for normal and foreseeable loads.

2. Cause of the [REDACTED] Incident

In my opinion, the incident was caused by the premature lifting of the pipe before the Mr. [REDACTED] had reached a safe position at the end of the pipe and was able to guide the pipe being lifted as necessary. That failure caused Mr. [REDACTED] to be knocked to the ground beside the trailer and for a secured pipe on the first row to come loose and fall on him.

3. Discussion of [REDACTED] Actions

This discussion of the actions of [REDACTED] actions is framed on the conditions contained in the Mandolidis Law.

(A) A specific unsafe working condition existed in the work place which presented a high degree of risk and strong probability of serious injury or death.

In my opinion there was no unsafe condition that existed on this work site. The rigging being used was normal and customary for the pipe line industry. The premature lifting was an unsafe act that was not and could not be anticipated by site supervisory personnel. The pipe that became loose during the events of the lifting was properly secured until it was unexpectedly pushed out of place. [REDACTED], the supervisor, [REDACTED] the operator, and [REDACTED], the laborer all knew the proper operating procedure and were attempting to execute same.

(B) The employer had a subjective realization and an appreciation of the existence of such specific unsafe working condition.

[REDACTED] knew that [REDACTED] was new and relatively inexperienced. As such he provided an instructional session with the pipe unloading crew prior to the process starting. Testimony from both Mr. [REDACTED] and Mr. [REDACTED] is that they knew and understood the procedures to be followed and were attempting to follow those procedures, which were normal and customary. Again, there was not an unsafe condition. The blocking in place was customary and adequate for foreseeable conditions.

(C) Such specific unsafe working condition was a violation of a state or federal safety statute, rule or regulation, whether cited or not or of a commonly accepted and well-known safety standard within the industry

The unsafe working condition involved in this action was the premature lifting of the pipe before personnel were safely out of the way. This premature lifting was likely caused by an inadvertent application of load during the removal of slack in the sling prior to beginning the lift. This was an inadvertent action and certainly not intentional. Also there is no way for [REDACTED] supervisory personnel to have notice of this condition or stop it once started. The failure was a violation of regulation and commonly accepted standards within the industry. This violation was caused by the laborers' inattentiveness or lack of safety consciousness.

(D) That notwithstanding the existence of the facts set forth in subparagraphs (A) through (C) hereof, such employer nevertheless thereafter exposed an employee to such specific unsafe working condition intentionally

Since the unsafe condition was actually the result of an inattentive action by Mr. [REDACTED], there is no way that [REDACTED] could have knowledge of such a condition.

With regard to Mr. [REDACTED] performance, he was a well qualified operator with years of experience. There was no evidence that there any problems with Mr. [REDACTED] work during his employment with [REDACTED].

E. That such employee so exposed suffered serious injury or death as a direct and proximate result of such specific unsafe working condition

I agree that Mr. [REDACTED] was injured as a result of the premature lifting of the pipe. This unsafe condition was the result of an inadvertent action that [REDACTED] had no notice of. Therefore [REDACTED] could not have knowingly exposed Mr. [REDACTED] to an unsafe condition.

[REDACTED] actions were reasonable in that they:

- Provided necessary instruction to employees prior to the starting of new tasks. Specific procedure were provided and explained in a manner that the employees understood. The employees were attempting to carry those steps out when the incident occurred.
- Lifting three pieces of pipe with a single choker hitch configuration was an acceptable and commonly used method of lifting small diameter pipe.
- Because of the nature of the operation, it was neither practical nor safe to use tag lines during the portion of the lift being made at the time of the incident. There is no way to push with a tag line. Balancing is best performed by hand with the body away from the load.
- If Mr. [REDACTED] had reached his intended position before the unexpected pipe movement occurred, he could have both leveled and prevented swing of the pipe.
- The blocking contained on the dunnage under the first row of pipe was adequate to prevent unintentional movement of the pipe under normal and foreseeable loads.

4. Discussion of Dr. [REDACTED] Report

In his report dated October 20, 2010, Dr. [REDACTED] provides fourteen (14) summary opinions and conclusions numbered 9 through 22. In summary they are paraphrased as follows:

- (9) The primary unsafe conditions and/or causative factors related to the incident are:
 - a) [REDACTED] failed to install side rails on the trailer to prevent pipe from falling off the trailer bed.
 - b) Failed to use proper rigging
 - c) Failed to use a tag line.
 - d) Failed to formally establish work rules.
 - e) Failed to provide a qualified person to establish work rules.
 - f) Failed to properly train their workers.
 - g) Failed to assign a competent person to the pipe unloading crew.

- (10) ██████ failed to provide Mr. ██████ a worksite free of hazards.
- (11) ██████ failed to properly implement basic elements of worksite safety programming.
- (12) ██████ failed to utilize any formal workplace safety analysis to be used in regard to each work assignment.
- (13) ██████ failed to utilize any pro-active formal workplace safety analysis technique to be used in regard to planned and systematic physical safety inspection of their workplace.
- (14) ██████ failed to develop and conduct overall workplace management, supervisor, and worker training activity.
- (15) ██████ failed to utilize the core principles of safety engineering and the cardinal rules of hazard control.
- (16) ██████ failed to exercise ordinary care to adhere to relevant or logically available provisions of well-known and readily available authoritative references.
- (17) All ██████ Comments contained in the attached File Note dated October 11, 2010 titled Topical Deposition Summary are incorporated herein by reference.
- (18) Specific unsafe working conditions existed in the workplace that presented a high degree of risk and probability of serious injury or death included:
 - The unloading of three sections of heavy pipe from a flatbed trailer in an unbalanced manner, such lift being susceptible to tilting, striking, and dislodging the remaining stored pipe.
 - The failure to require the use of a tag line that would have allowed Mr. ██████ to control the load.
 - Given the above unsafe conditions, the failure to install side rails (stacks) on the side of the trailer.
- (19) ██████ had a subjective realization and an appreciation of the existence of the specific unsafe working conditions and of the high degree of risk and the strong probability of serious injury or death presented by such specific unsafe working conditions to include:
 - Use of a single sling to lift three sections of heavy pipe that did not balance the load, allowing the load to tilt and stick the remaining pipe stored on the trailer.
 - Instructing Mr. ██████ to guide and attempt to control the load by hand while positioned dangerously adjacent to the load.
 - The failure to prevent the remaining stored pipe from falling from the trailer through the use of side rails.
 - The failure to properly instruct Mr. ██████ in the recognition and avoidance of unsafe conditions.
- (20) The specific unsafe working conditions listed above were a violation of specific safety regulations and/or violations of well-known, long established, and commonly accepted safety standards.

- (21) ██████████ nevertheless exposed Mr. ██████████ to such specific unsafe working conditions intentionally; and Mr. ██████████ suffered serious injury as a direct and proximate result of those specific unsafe working conditions.
- (22) The above-discussed unreasonably dangerous working conditions and associated actions (and Inactions) on the part of ██████████ were the direct and proximate causes of the incident and related injuries, that occurred to Mr. ██████████.

Since many of these opinions are intertwined and some discussion has already been provided in earlier sections of this report, A few comments will provided that address most of the issues.

Dr. ██████████ opines the rigging used was not proper and was one of the dangerous conditions. I disagree. Single choker hitch lifts are used all the time. In my opinion, three pieces of pipe in a lift was reasonable. The force required to balance a load where the sling was not perfectly aligned would be in the order of 10 to 20 pounds. The diameter of the pipe and the configuration of the three pipe would allow adequate contact between the sling and components of the load. There was no evidence that the load slipped or moved relative to the sling prior to the incident occurring. I have personally observed this type of rigging being used safely numerous times in the field.

Dr. ██████████ also opines that a tag line should have been used and was one the dangerous conditions that were causative to the incident. I disagree. When one is guiding a pipe at the elevations involved and in the environment of the trailer bed, there is not room to move away from the load. Hand contact with the load in this area and under these conditions was appropriate, practical and safe.

Dr. ██████████ made numerous comments about ██████████ failing to implement formal safety management technique. To my Knowledge, OSHA does not require a formal written plan as long as the employer is complying with educating his employees. Between weekly tool box meetings and instructions provided by supervisory personnel and other experienced workers, it is apparent that Mr. ██████████ has sufficient information to safely perform the work he was attempting to do at the time of his incident.

Dr. ██████████ stated that ██████████ had subjective realization of the unsafe condition and yet knowingly and intentionally exposed Mr. ██████████ to those unsafe conditions. I disagree. The unsafe condition was cause by a momentary inadvertent act of which there could be no notice. Even if there had been a supervisor present at the trailer, he could not have stopped the incident once the inadvertent premature lifting occurred.

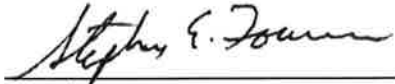
In my opinion, the unsafe conditions which Dr. ██████████ attributes to this incident are without proper basis and most were not causative to the incident. The incident was caused by an inadvertent act of which there could not have been any notice. The incident was unfortunate, but certainly does not rise to the level to satisfy Mandolidis requirements.

E. FINDINGS

Within the bounds of reasonable technical certainty, and subject to change if additional material becomes available, it is my professional opinion that:

1. Construction safety standards applicable to this incident include:
 - Informing employees of the hazards of their work environment and the precautions to eliminate or remove them.
 - Ensuring the employees know what is expected of them.
 - Not lifting loads until all personnel are clear from expected paths of load movement.
 - Pipe be adequately secured for normal and foreseeable loads.
2. In my opinion, the incident was caused by the premature lifting, resulting from an inadvertent application of load during the removal of slack in the sling prior to beginning the lift before the Mr. [REDACTED] had reached a safe position at the end of the pipe and was able to guide the pipe as necessary. That failure caused Mr. [REDACTED] to be knocked to the ground beside the trailer and for a secured pipe to come loose and fall on him.
3. [REDACTED] actions were reasonable in that they:
 - Provided necessary instruction to employees prior to the starting of new tasks. Specific procedure were provided and explained in a manner that the employees understood. The employees were attempting to carry those steps out when the incident occurred.
 - Lifting three pieces of pipe with a single choker hitch configuration was an acceptable and commonly used method of lifting small diameter pipe.
 - Because of the nature of the operation, it was neither practical nor safe to use tag lines during the portion of the lift being made at the time of the incident. There is no way to push with a tag line. Balancing is best performed by hand with the body away from the load.
 - If Mr. [REDACTED] had reached his intended position before the unexpected pipe movement occurred, he could have both leveled and prevented swing of the pipe.
 - The blocking contained on the dunnage under the first row of pipe was adequate to prevent unintentional movement of the pipe under normal and foreseeable loads.
4. In my opinion, the unsafe conditions which Dr. [REDACTED] attributes to this incident are without proper basis and most were not causative to the incident. The incident was caused by an inadvertent act of which there could not have been any notice. The incident was unfortunate, but certainly does not rise to the level to satisfy Mandolidis requirements.

5. Mr. [REDACTED] inadvertent premature and unintentional lifting of the pipe caused the incident. The inadvertent actions of a single employee certainly do not rise to a level where any action would satisfy the Mandolidis requirements against the employer.



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