Alberta Government

Investigation Report

Worker fatally crushed in equipment

November 18, 2014

WORK SAFE ALBERTA

The contents of this report

This document reports Occupational Health and Safety's investigation of the workplace fatality where a worker was crushed in a piece of equipment in November 2014. It begins with a short summary of what happened. The rest of the report covers this same information in greater detail.

Incident summary

Workers employed by a sewer re-lining company that was a sub-contractor on a road-building project in Southeast Calgary were in the process of installing a Cured in Place Pipe (CIPP) liner into a sewer line which ran under Deerfoot Trail South in Calgary Alberta. During the installation process, workers attempted to open a pneumatic clamp mechanism that had been secured with a ratchet strap which had been left in place inadvertently. Workers were in the process of releasing the strap while the clamp was still engaged when a labourer entered the mechanism of the installation unit. The crew supervisors operating the equipment were not aware that the worker had entered the unit. Just as the worker entered the mechanism the ratchet strap released, resulting in the labourer being struck in the head by the clamp mechanism. The worker sustained fatal injuries and succumbed to his injuries later the same day.

Background information

Alberta Transportation is the provincial ministry responsible for the development, operation and maintenance of transportation infrastructure in the province of Alberta. Alberta Transportation awarded a contract to Chinook Road Partnership (a consortium of companies headed by SNC Lavalin Inc.) for the design, construction, operation, and maintenance of the Southeast Stoney Trail in Calgary, Alberta from Highway 1A in the east to east of Macleod Trail in the south. The contract included the construction of 25 kilometres of road and 29 bridge structures. The construction phase was scheduled to be complete in late fall 2013. Maintenance of this portion would be handled by Chinook Road Partnership until 2043.

Chinook Roads Partnership is a general partnership established between SNC-Lavalin Chinook Roads GP Inc. and Acciona Chinook Roads GP Inc. for the purpose of undertaking the contract to design, construct, operate, and maintain the Southeast portion of Stoney Trail in Calgary from Highway 1A in the east to east of Macleod Trail in the south.

Chinook Infrastructures is a joint venture between SNC-Lavalin Constructors (Pacific) Inc. and Acciona Infrastructures Canada Inc. established to undertake the design and construction of the Southeast portion of Stoney Trail in Calgary, Alberta from Highway 1A in the east to east of

Macleod Trail in the south. Chinook Infrastructures was contracted to Chinook Roads Partnership.

Insituform Technologies Ltd. (ITL) is a company that specializes in the installation of cured-in place pipe (CIPP) for the rehabilitation of existing pipeline systems. Insituform Technologies Ltd. is a subsidiary of Aegion Corporation. Insituform Techologies Ltd. was contracted by Chinook Infrastructures to rehabilitate City of Calgary sewer lines that were located within the Transportation Utility Corridor (TUC) for the Southeast Stoney Trail (SEST) Project.

The deceased worker had been employed as a labourer by Insituform Technologies Ltd. for approximately six months and had worked on similar installation crews prior to the incident.

Equipment and materials

Dual Gland Air Inversion (DGAI) Unit

The Dual Gland Air Inversion (DGAI) system was designed and is manufactured by Insituform Technologies Ltd. and is operated by Insituform Technologies Ltd. in sub-surface infrastructure relining projects world-wide.

The DGAI system is used to feed a urethane resin-impregnated liner into the sewer in an inverted manner. The liner is folded in on itself and is inserted in to the sewer line through the use of compressed air. The DGAI consists of a mounting frame to secure the liner during the process and two pneumatically operated clamp systems or “glands” which are used to control air pressure during the insertion process and later steam pressure during the curing process.

The DGAI unit is constructed of hollow structural steel with a fixed catwalk on the back or “live” side. The system also had two pairs of pneumatic cylinders which are connected to the “glands” – one lower gland located near the middle of the frame and one upper gland. Each gland operates independently by means of separate and independent two-position controls located on the right side of the unit when viewed from the front or “dead” side of the frame. The glands were constructed of 10 cm diameter tubular steel and consisted of one fixed section and one moveable section. Expanded metal mesh on the sides of the frame covers the pneumatic cylinders and their associated pinch points.

The pneumatic components of the system are supplied with compressed air from portable air compressors which also supply the compressed air for the inversion process. At the time of the incident, the system was connected to a 1600 cfm Sullair 1600H air compressor and an 825 cfm Doosan XP825 air compressor. The glands were being operated at approximately 100 p.s.i.

During the insertion process air pressure at between 8 to 9 p.s.i. was being used to move the liner through the sewer.

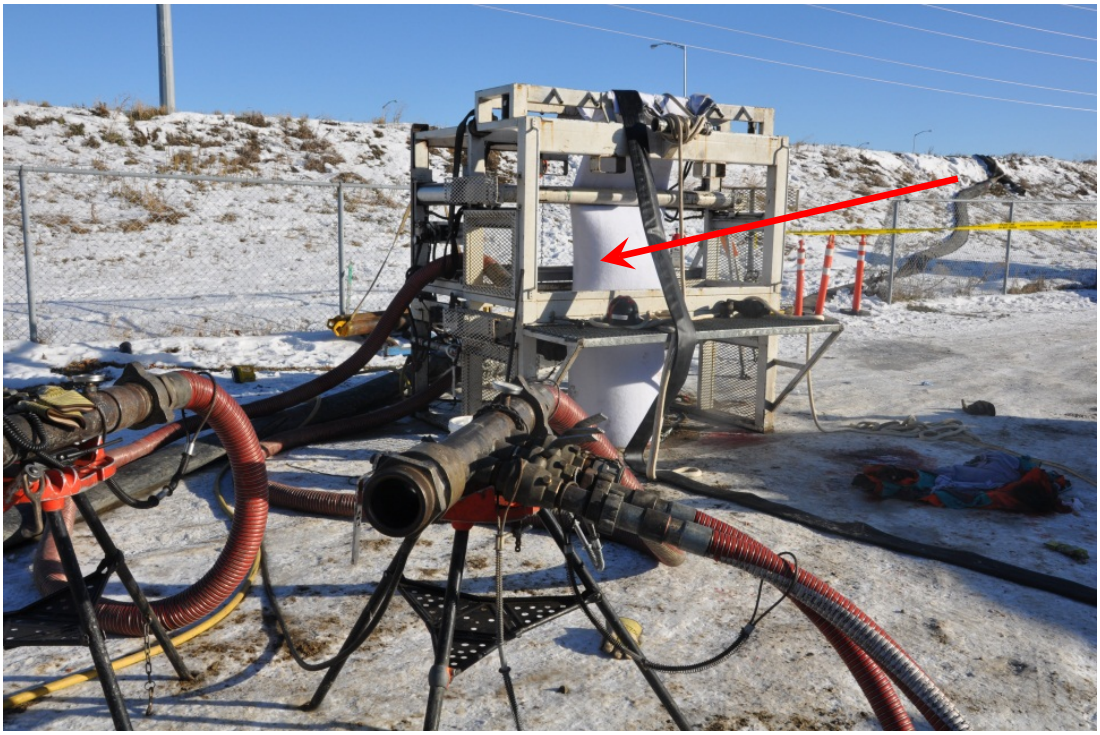

Figure 1. Dual Gland Air Inversion (DGAI) Unit located in alley beside 129 Cranberry Square, Calgary, Alberta the day of the incident. The photo shows the liner (indicated by arrow) in place in the DGAI Unit.

The liner is controlled during installation and inflation by means of a guide rope. The inflated and everted liner is cured through the introduction of steam into the liner through the use of a "layflat", a rubberized hose that is run the length of the liner.

Pacific Cargo Control Inc. Ratchet Strap (no S/N)

Length: 30 feet (9.14 metres)
Width: 2 inches (5.08 cm)
Model No.: 36230-FH
Working Load Limit (WLL): 3335 lbs (1512 kg)

This was a cargo-restraint device composed of a webbing strap, flat hooks and a standard in-line ratchet handle. This style of strap was designed and is sold for securement of cargo on trailers. At the time of the incident, the flat hooks were connected in an orientation where one hook was positioned ninety degrees to the other hook as shown in Figure 2.

According to information provided by Insituform Technologies Ltd. personnel, these straps were used in the operation of the DGAI to increase the closure of the upper gland during steaming/curing of the lining and were included as part of the written work procedure. Workers applied a strap on the lower gland because the air pressure during the insertion process was causing the gland to be pushed open.

Figure 2. Ratchet strap in place on lower gland of the DGAI.

Sequence of events

On November 18, 2014 work was being undertaken by Insituform Technologies Ltd. to reline existing City of Calgary sanitary sewers in the community of Cranston in Southeast Calgary as part of the Southeast Stoney Trail project. The project was overseen by Chinook Infrastructures.

At the time of the incident, ITL was in the process of inserting a liner in a sanitary sewer located in an alley in the community of Cranston. The sewer ran underneath Deerfoot Trail South.

Workers had inserted the liner approximately halfway using compressed air and had just added the “layflat” and guide line into the system. In order to do this, “glands” at the top and middle of the DGAI are opened and closed pneumatically to maintain pressure in the system. The workers had closed the top glands and were in the process of opening the lower gland at the time of the incident.

Prior to the incident, workers had applied a ratchet strap, normally used for securing cargo, to the lower gland to keep it closed in order to maintain air pressure in the liner during the inversion process.

Workers were proceeding to open the lower gland to allow the layflat and guide rope to pass the lower gland when they realized that the strap was still in place. The gland was being operated at approximately 100 psi. The ITL supervisor attempted to release the ratchet strap while the gland was still engaged but was unsuccessful. With the gland engaged, the strap and ratchet were under additional tension. The ITL supervisor called for the DGAI operator (ITL superintendent) to reverse the gland however the DGAI operator was adjusting a guide on a cylinder assembly located to the right of the Operator’s Station. The DGAI operator was not able to see the supervisor when the request was made to back the gland off because his line of sight with the ITL supervisor was blocked by the dry end of the liner which was inflated in the middle of the DGAI Unit. The ITL supervisor left front of the DGAI to find the DGAI operator because the system noise from the compressed air made communication difficult in addition to the line of sight issue. At the same time, the DGAI operator was attempting to determine where the ITL supervisor was before moving the gland so as not to injure the worker. Unknown to either worker, the ITL labourer accessed the DGAI from underneath a fixed work platform located on the back or “live” side of the DGAI. He was kneeling in front of the gland when the ratchet released on its own causing the gland to move forward, trapping the ITL labourer between the steel gland and the steel frame of the DGAI Unit.

Statements made to Occupational Health and Safety by the Insituform personnel on site indicated that the labourer had been working between the reefer truck and spool of the control line just prior to the incident (Refer to Figure 3).

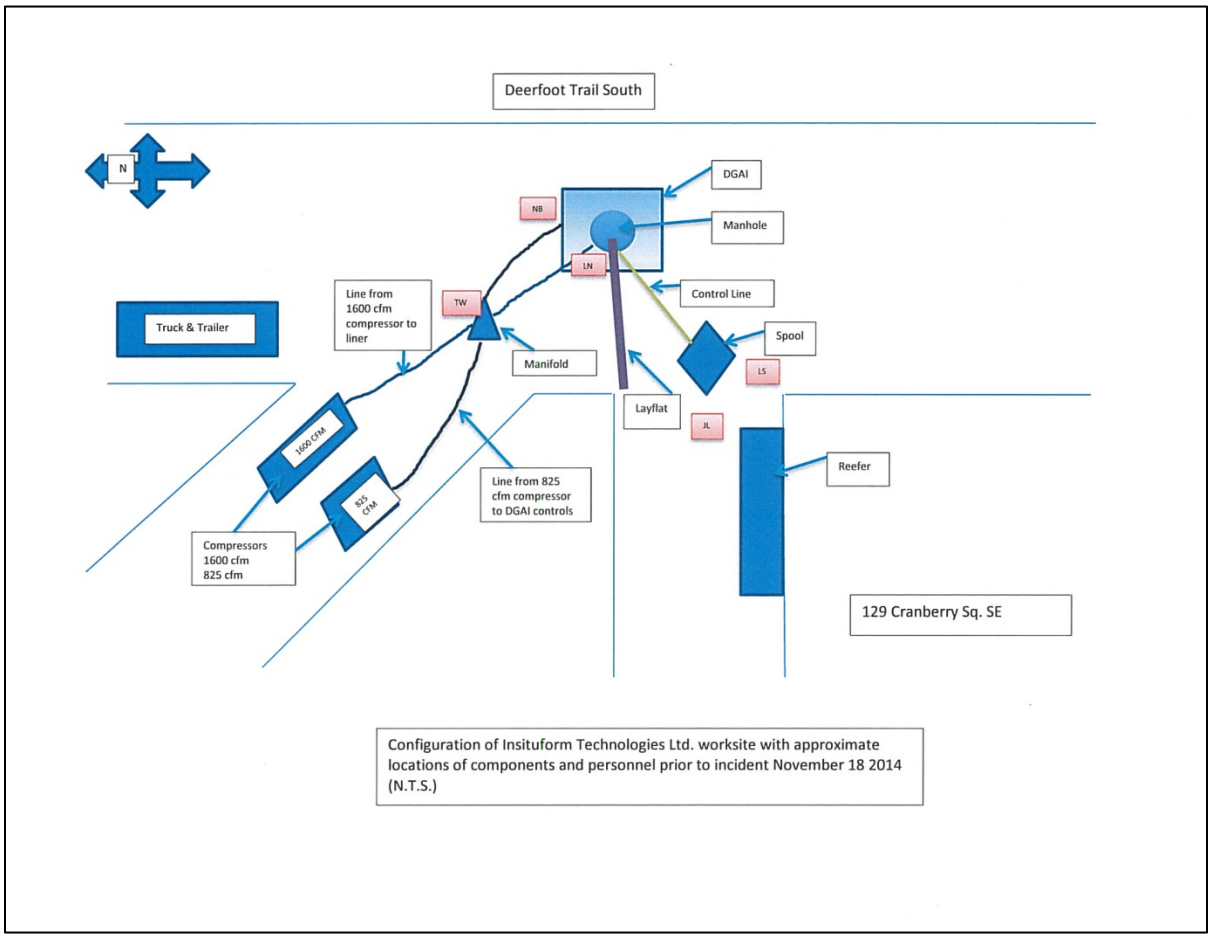

Figure 3. Site map showing approximate location of workers and equipment just prior to incident November 18, 2014.

The ITL labourer was struck in the face by the moving gland. The ITL supervisor immediately came to labourer's aid where he found him unresponsive and not breathing. The ITL supervisor performed one-handed CPR and attempted to staunch the bleeding from the facial wound while EMS was contacted. The ITL labourer was resuscitated and transported with weak vital signs to Foothills Medical Centre where he later succumbed to his injuries.

Completion

A review for enforcement action was completed on October 28, 2015 and it was determined that prosecution or an administrative penalty were not appropriate based on the circumstances surrounding this incident.

This file was closed on October 30, 2015.

Signatures

ORIGINAL REPORT SIGNED	October 30, 2015
Lead Investigator	Date
ORIGINAL REPORT SIGNED	October 30, 2015
Manager	Date
ORIGINAL REPORT SIGNED	November 9, 2015
Director	Date