

Workplace Health and Safety Fatality Report



WORKER'S HEAD CRUSHED BETWEEN PIPE SPOOLS

Date of Incident: December 12, 2007

Type of Incident: Fatal

Government of Alberta ■
Employment and Immigration

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SECTION 1.0 DATE AND TIME OF INCIDENT

1.1 The incident occurred on December 12, 2007 at approximately 4:30 p.m.

SECTION 2.0 NAME AND ADDRESS OF PRINCIPAL PARTIES

2.1 Owner

2.1.1 EnCana Corporation
421-7th Avenue
P.O. Box 2850
Calgary, Alberta
T2P 2S5

2.2 Prime Contractor

2.2.1 EnCana Corporation
421-7th Avenue
P.O. Box 2850
Calgary, Alberta
T2P 2S5

2.3 Employer(s)

2.3.1

2.4 Contractor(s)

2.4.1 Bonnyville Welding Ltd.
P.O. Box 8075
Bonnyville, Alberta
T9N 2J3

2.5 Supplier(s)

2.5.1 Not applicable

2.6 Worker(s)

2.6.1 Steamfitter/Pipefitter, Gasfitter (B), (Owner Operator of

2.7 Others

2.7.1 Not Applicable

SECTION 3.0 DESCRIPTION OF PRINCIPAL PARTIES

- 3.1 EnCana Corporation, the Owner and the Prime Contractor for the facility, operates the Foster Creek plant which produces oil from the McMurray formation of the Athabasca oil sands by means of a technology called steam assisted gravity drainage (SAGD). SAGD is a thermal method for recovering heavy oil. The process uses twin horizontal wells drilled and extended into the base of a reservoir with a horizontal steam injector placed directly above the horizontal production well. Steam is injected in the upper well to warm the bitumen and make it less viscous so it can drain to the lower well and pumped to the surface.
- 3.2 Bonnyville Welding Ltd. was hired by EnCana Corporation for the fabrication, construction and installation of piping, flow lines and gathering systems along the DET-D-0903-2-01-01 pipe rack, which included a length of piping referred to as the 14 inch (355 mm) diameter pipe spool # PW-ABA-14-9353-38H-GT.
- 3.3 The owner/operator was a Journeyman Steamfitter/Pipefitter; who sub-contracted to Bonnyville Welding Ltd. He was fitting a portion of a 14 inch (355 mm) diameter pipe spool # PW-ABA-14-9353-38H-GT along the pipe rack # DET-D-0903-2-01-01, located in modular # 939.

SECTION 4.0 LOCATION OF INCIDENT

- 4.1 EnCana Corporation's Foster Creek, Commercial Plant Phase 14-22-70-4 W4, Cold Lake Air Weapons Range, Cold Lake Alberta.
- 4.2 At pipe rack DET-D-0903-2-01-01, in modular # 939.

SECTION 5.0 EQUIPMENT, MATERIAL AND OBSERVATIONS

5.1 Equipment and Material

5.1.1 Pipe rack DET-D-0903-2-01-01, in modular # 939

- 5.1.1.1 The incident occurred in the SAGD plant site in a pipe rack modular referred to as #939. Pipe spools can run both horizontally and vertically throughout the pipe rack modular(s). The pipe spools are supported approximately 4 metres (m) high within the pipe rack modular(s). The pipe rack modular(s) support and guide the pipe spools throughout the SAGD plant. On the day of the incident the work consisted of loading the pipe rack modular(s) with pipe spools and welding the lengths of pipe spools together. These lines become part of a network of existing process lines. This work is conducted in the vicinity of live process piping that exists within the pipe rack modular(s).

5.1.2 **14 inch (355 mm) diameter Pipe Spool Package**

5.1.2.1 The package consisted of five pipe spools and measured approximately 59 m in total length. The pipe spool package was made of schedule 40 steel materials and weighed approximately 4795 kilograms (kg).

5.1.2.2 A pipe spool can be of varying lengths and comes in a variety of diameters. Pipe Spool # PW-ABA-14-9353-38H-GT package measured 14 inches (355 mm) in diameter and each pipe spool measured approximately 11.4 m in length.

5.1.2.3 Four piping joints measuring 14 inches (355 mm) in diameter were welded together, end to end.
(Attachment "C" Photograph # 5)

5.1.3 **Pipe Shoes**

5.1.3.1 Seventeen pipe shoes supported the 59 m length of pipe spool within the pipe rack modular(s); sixteen shoes were welded directly to the 14 inch (355 mm) diameter pipe spool. One shoe, closest to the worker, was not welded to the pipe spool.
(Attachment "C" Photograph # 5, 7)

5.1.4 **Lever Block (Come-a-long)**

5.1.4.1 Kito Corp, 1 ½ Ton capacity. This come-a-long was used to pull the pipe spool out of alignment which allowed a work space to be created for a welder to weld a pipe spool joint. (Attachment "C" Photograph # 3)

5.1.5 **Lever Block (Come- a-long)**

5.1.5.1 Kito Corp, 3 Ton capacity. This come-a-long was used as a backup to the 1 ½ Ton come-a-long. (Attachment "C" Photograph # 3)

5.1.6 **Beam Clamp**

5.1.6.1 General Clamp Industry Inc. The beam clamp attaches to the beam of the pipe rack modular. The beam clamp is used as an attachment point for the come-a-long. One beam clamp was found at the incident location.
(Attachment "C" Photograph # 3)

5.2 **Observations**

5.2.1 On December 13, 2007, during the investigation, the weather was overcast, -32^o Celsius (includes a wind chill). Similar weather was reported on the previous day.

5.2.2 The 59 m length of pipe spool on the east end of the pipe spool was noted as not being tack welded.

- 5.2.3 The 14 inch (355 mm) diameter Pipe spool # PW-ABA-14-9353-38H-GT, a line adjacent to pipe spool # PW-ABA-14-9353-38H-GT, was found to be floating and not contacting the I-Beam supports of the pipe rack modular. (Attachment "C" Photograph # 12)
- 5.2.4 The beam clamp, the 1 ½ and 3 Ton come-a-long were noted as being moved from their original positions in order to care for the injured worker.

SECTION 6.0 NARRATIVE DESCRIPTION OF THE INCIDENT

- 6.1 Earlier in the day of December 12, 2007, the 14 inch (355 mm) diameter Pipe spool # PW-ABA-14-9353-38H-GT was purposely misaligned to gain access to an adjacent pipe already in position. This task is also known as spreading pipe. The Pipefitter and Foreman pulled the pipe spool with a 3 Ton come-a-long attached to a beam clamp on the north side of modular #939. A work space of several centimeters' (cm) was created between two pipe spools to allow a welder to access to the adjacent pipe spool joint and weld it. A second 1 ½ Ton come-a-long was added to the west of the 3 Ton come-a-long as a backup. (Attachment "C" Photograph # 1, 3, 6)
- 6.2 On December 12, 2007 at approximately 4:20 p.m. the Pipefitter and Helper were preparing to realign the 14 inch (355 mm) diameter pipe spool #PW-ABA-14-9353-38H-GT and hot bolt the pipe to a flange connection. The pipe spool ran in an east/west direction along the pipe rack section (DET-D-0903-2-01-01).
- 6.3 The Helper, a second year Pipefitter, was in a Genie man-lift under the flange connection of the 14 inch (355 mm) diameter pipe spool l #PW-ABA-14-9353-38H-GT. The Helper was ready to hot bolt the flange ends at the connection immediately west of modular # 939. (Attachment "C" Photograph # 5)
- 6.4 The Pipefitter removed the first of two come-a-longs; a 1 ½ Ton originally used as back up to secure the 14 inch (355 mm) diameter pipe spool l #PW-ABA-14-9353-38H-GT. The Pipefitter then proceeded to remove the 3 Ton come-a-long located in the east hoarding. (Attachment "C" Photograph # 4)
- 6.5 At approximately 4:50 p.m. other workers heard two consecutive bangs a few seconds apart. The Helper stated he saw the 14 inch (355 mm) diameter pipe spool shift to the south as the Helper stood under the flange connection in the Genie man-lift. The Helper called out to the Pipefitter. There was no response from the Pipefitter (Attachment "C" Photograph #6)

- 6.6 The 14 inch (355 mm) diameter pipe spool 1 #PW-ABA-14-9353-38H-GT package rolled off its supporting pipe shoes and tipped over to the south side of the pipe rack. It was at this time that the Pipefitter was injured.
(Attachment "C" Photograph # 7, 8)
- 6.7 Workers that were in the area, Foreman, Pipefitter 2 and Superintendent climbed the scaffold to where the Pipefitter was working in the hoarding to check on him. They found the Pipefitter lying on the scaffold deck unconscious. He was bleeding severely from the head.
- 6.8 One of the attending workers, the Apprentice Welder was told to summon emergency services and ensure that an ambulance was called. The attending workers performed cardiopulmonary resuscitation until emergency services arrived.
- 6.9 The Pipefitter was transferred to a local hospital. The Pipefitter had succumbed to the injuries sustained while in hospital. The Pipefitter was subsequently transferred to the Medical Examiner's office in Edmonton.

SECTION 7.0 ANALYSIS

7.1 Direct Cause

- 7.1.1 The Pipefitter suffered a fatal head injury when the 14 inch (355 mm) diameter pipe spool he was working on tipped over and crushed his head against an adjacent 20 inch (508 mm) diameter pipe spool.

7.2 Contributing Factors

- 7.2.1 The 14 inch (355 mm) diameter pipe spool #PW-ABA-14-9353-38H-GT was moved away from the adjacent piping to gain several centimeters' of additional work space in between. This additional work space between piping allowed a welder to access the adjacent pipe seam in order to weld it. No written plans or provisions were made by Bonnyville Welding Ltd. to restrain the piping so that it could not spring back or tip over when the tension from the 1 ½ Ton and 3 Ton come-a-longs was released.
- 7.2.2 Cable lashing and U-bolt clip restraints observed throughout the length of the # DET-D-0903-2-01-01 pipe rack, which prevents various piping or pipe spools from rolling or tipping over, were not used to temporarily secure the 14 inch (355 mm) diameter pipe spool involved in the incident in accordance with the Bonnyville Welding Ltd. procedures regarding cable clips.
(Attachment "C" Photograph #9, 10)

- 7.2.3 The 14 inch (355 mm) diameter pipe spool #PW-ABA-14-9353-38H-GT was not welded or tied into the exiting piping elbow in modular #937 on the east end of the 14 inch (35.5 cm) pipe spool. Had the pipe spool been welded or tied in, the package would have been secured from tipping. (Attachment "C" Photograph #11)
- 7.2.4 Sixteen of seventeen pipe shoes observed supporting the piping were welded directly onto the 14 inch (355 mm) diameter pipe spools. The one pipe shoe not welded to the pipe spool was found nearest to the Pipefitter.. (Attachment "C" Photograph #7)
- 7.2.5 The Pipefitter, was last seen working in the east hoarded work platform. Other workers were nearby, however there were no other workers working along side the Pipefitter, inside the hoarding.
- 7.2.6 The shoes welded to the pipe spool # PW-ABA-14-9353-38H-GT were not "U" clipped or secured by wire rope to the modular supports in order that the pipe spool # PW-ABA-14-9353-38H-GT could be moved from side to side to gain access to adjacent pipe spool joints for welding. (Attachment "C" Photograph #11)
- 7.2.7 EnCana Corporation and Bonnyville Welding Ltd. representatives reported the 59 metres length of pipe spool as being tack welded on the east end of the pipe spool; it was noted as not being tack welded upon inspection. (Attachment "C" Photograph #12)

SECTION 8.0 FOLLOW-UP/ ACTION TAKEN

8.1 Employment and Immigration; Alberta Workplace Health and Safety Compliance

- 8.1.1 Workplace Health and Safety Compliance issued orders to EnCana Corporation to conduct an investigation, prepare a report and have it available for review by Alberta Workplace Health and Safety Compliance.
- 8.1.2 Alberta Workplace Health and Safety Compliance issued orders to EnCana Corporation to provide specific documentation that related to the incident to assist in the Workplace Health and Safety Compliance investigation.
- 8.1.3 Workplace Health and Safety Compliance issued orders to Bonnyville Welding Ltd. to provide specific documentation that related to the incident to assist in the Workplace Health and Safety Compliance investigation.

8.2 Industry

- 8.2.1 EnCana Corporation made available to Alberta Workplace Health and Safety Compliance an incident investigation report regarding the circumstances of the

incident.

8.2.2 EnCana Corporation submitted the requested information to Alberta Workplace Health and Safety Compliance.

8.2.3 Bonnyville Welding Ltd. submitted the requested information to Workplace Health and Safety Compliance.

8.3 Additional Measures

8.3.1 No additional measures required.

SECTION 9.0 SIGNATURES

Original Report Signed _____
Lead Investigator Date

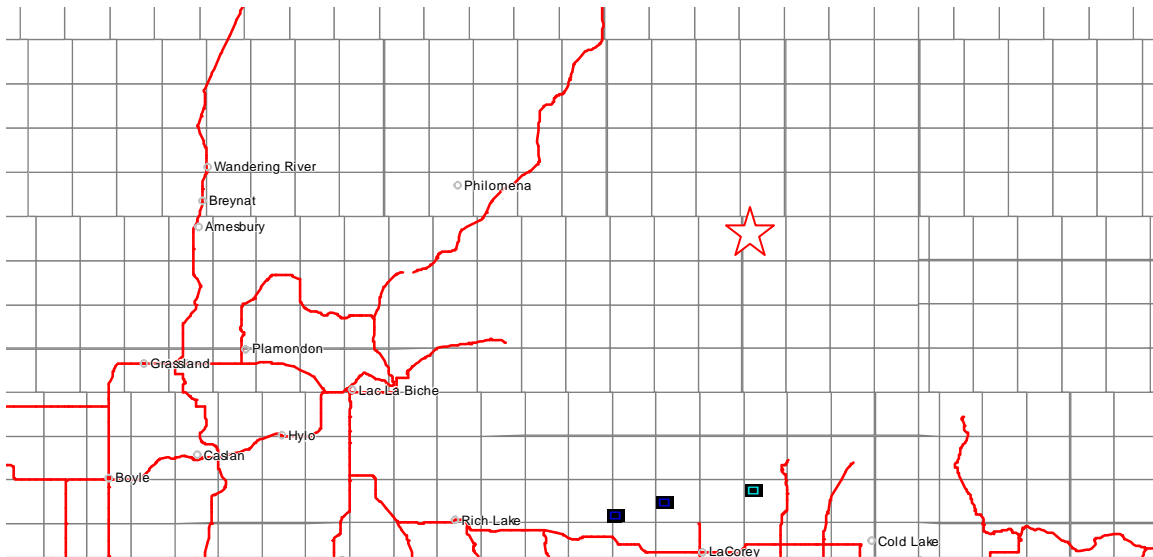
Original Report Signed _____
Investigator Date

Original Report Signed _____
Manager Date

Original Report Signed _____
Regional Senior Manager, North Date


SECTION 10.0 ATTACHMENTS:

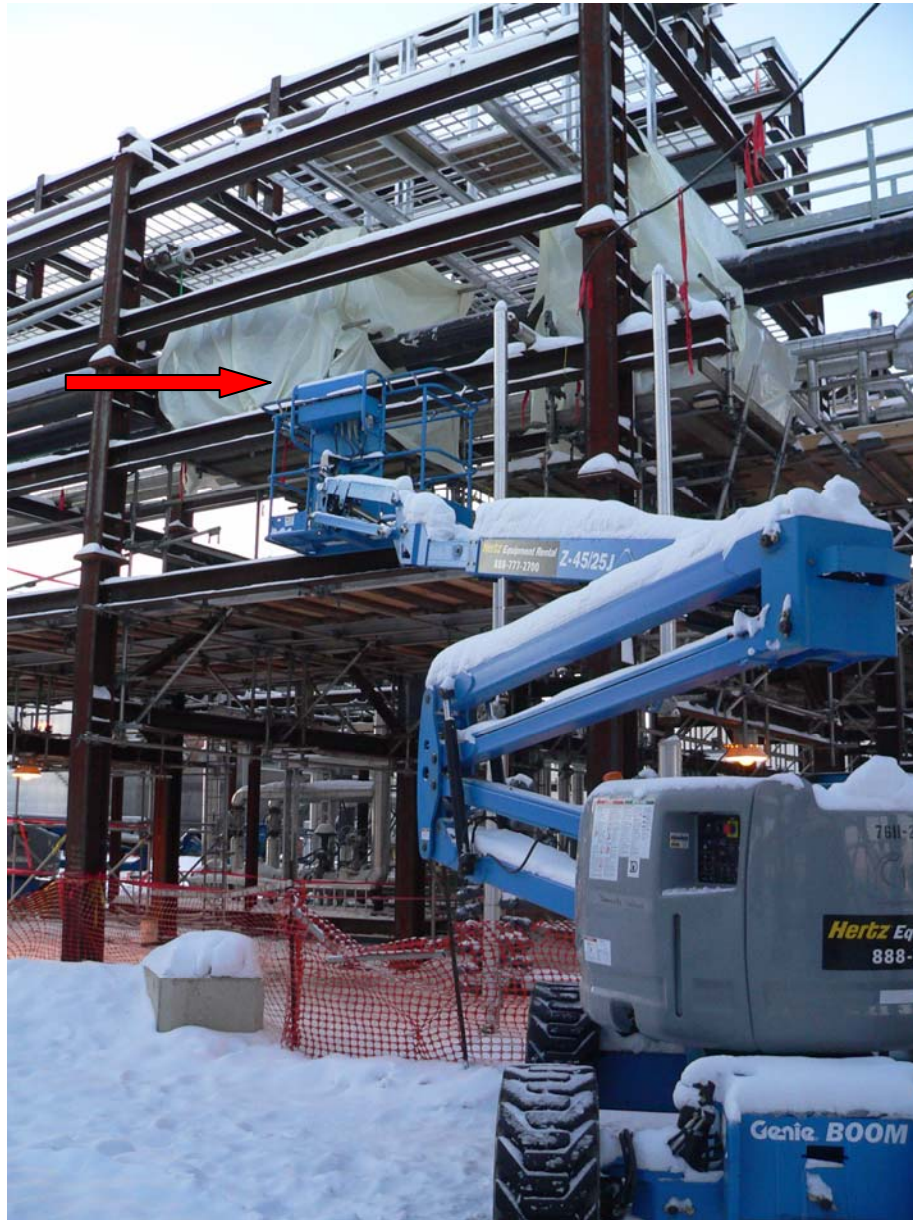
Attachment A Maps
Attachment B Diagrams
Attachment C Photographs



★ Incident site location 14-22-70-04 W4

11	12	07	08	09	10	11	12	07	08	09	10	11	12	07	08	09	10	11	12	0
071-06W4 02	01	06	05	071-05W4 04	03	02	01	06	05	071-04W4 04	03	02	01	06	05	071-03W4 04	03	02	01	071-02 0
35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	
26	25	30	29	28	27	26	25	30	29	28	27	26	25	30	29	28	27	26	25	
23	24	19	20	21	22	23	24	19	20	21	22	23	24	19	20	21	22	23	24	
070-06W4				070-05W4						070-04W4						070-03W4				070-02
14	13	18	17	16	15	14	13	18	17	16	15	14	13	18	17	16	15	14	13	
11	12	07	08	09	10	11	12	07	08	09	10	11	12	07	08	09	10	11	12	
02	01	06	05	04	03	02	01	06	05	04	03	02	01	06	05	04	03	02	01	
35	36	31	32	33	34	35	36	31	32	33	34	35	36	31	32	33	34	35	36	
069-06W4				069-05W4						069-04W4						069-03W4				069-02
26	25	30	29	28	27	26	25	30	29	28	27	26	25	30	29	28	27	26	25	

 Incident site location: LSD 14-22-70-04 W4

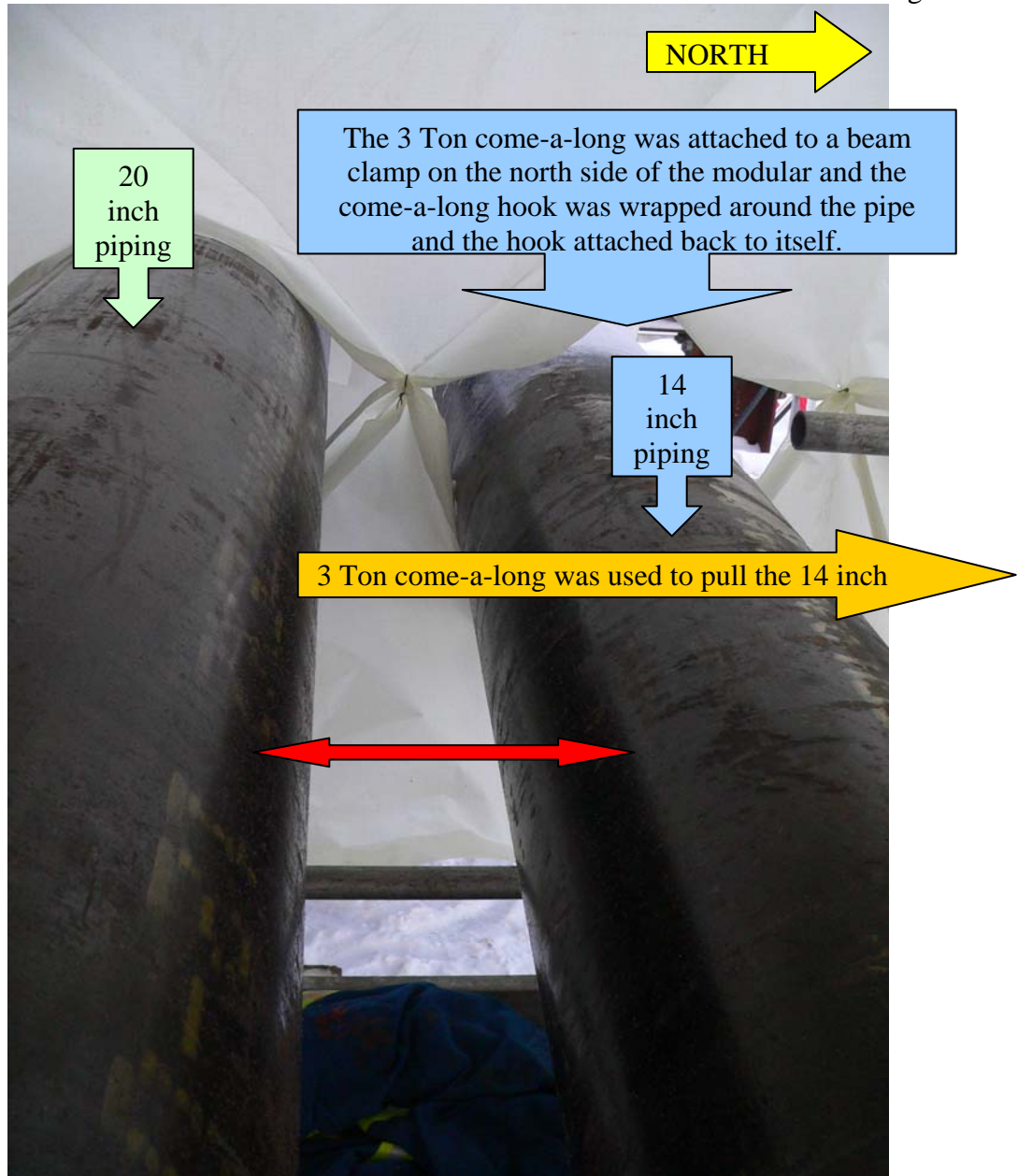


Photograph #1

Facing southwest looking at the incident location. (red arrow)

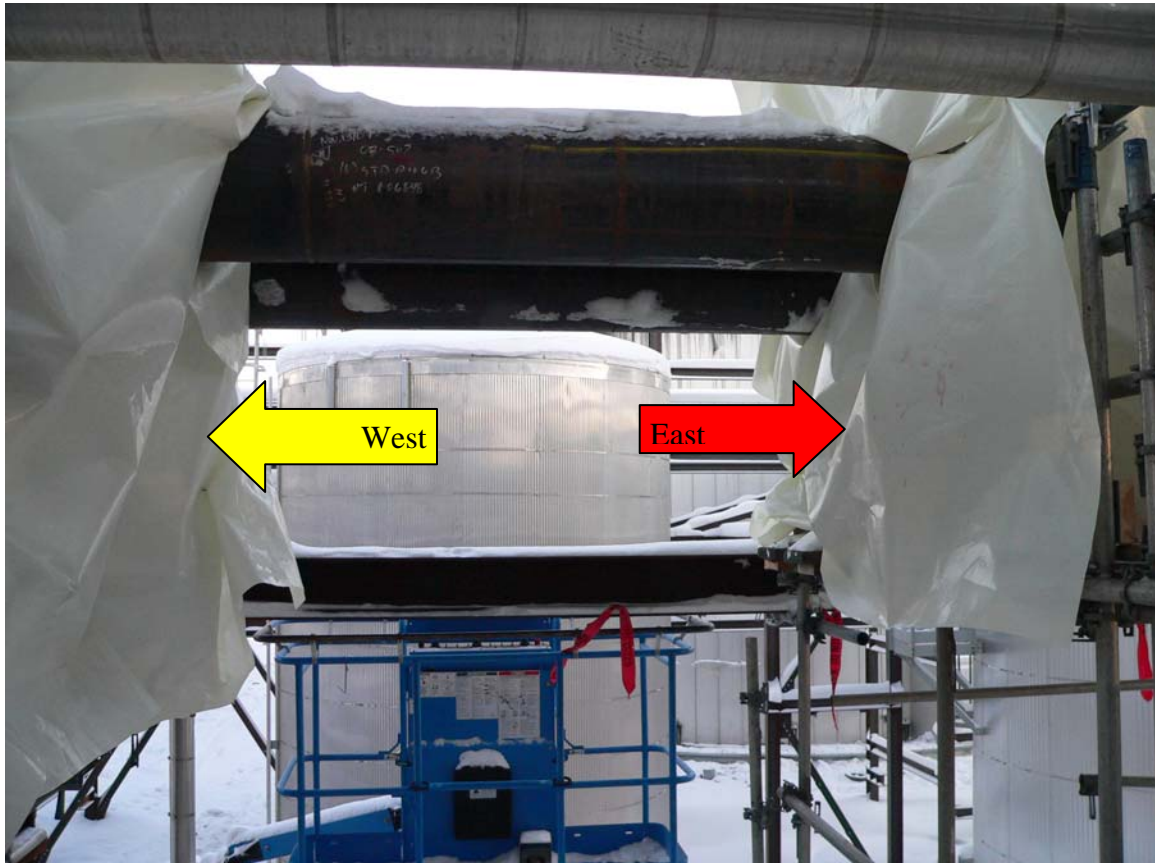


Photograph #2 Shows the beam clamp (Blue arrow), 1 1/2 Ton (yellow arrow) and 3 Ton come-a-long (red arrow) used to tug the pipe spool. The last position of the come-a-longs was disturbed to provide emergency assistance to the worker.



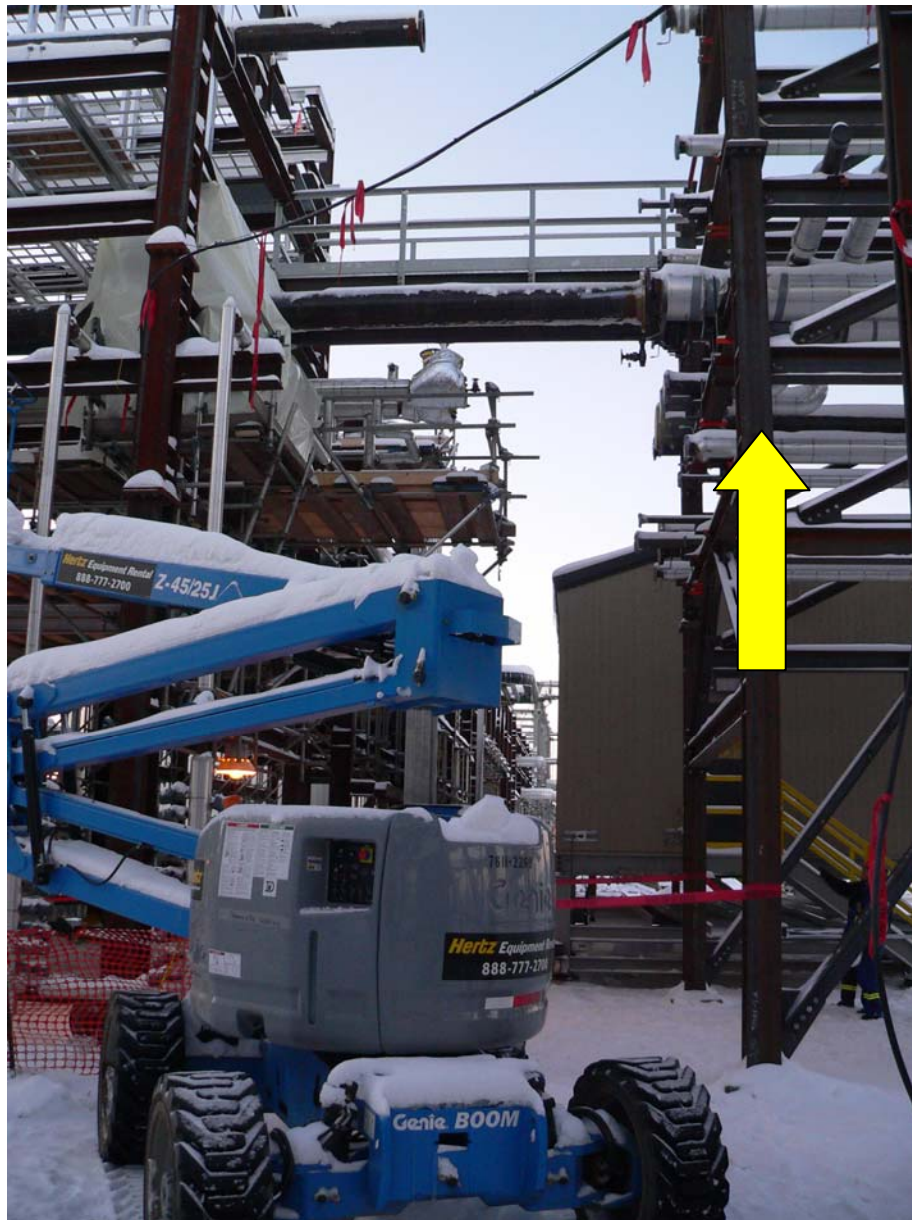
Photograph #3

A work space (Red arrow) was created by pulling the 14 inch piping to the north with a 3 Ton come-a-long attached to an adjacent beam clamp.



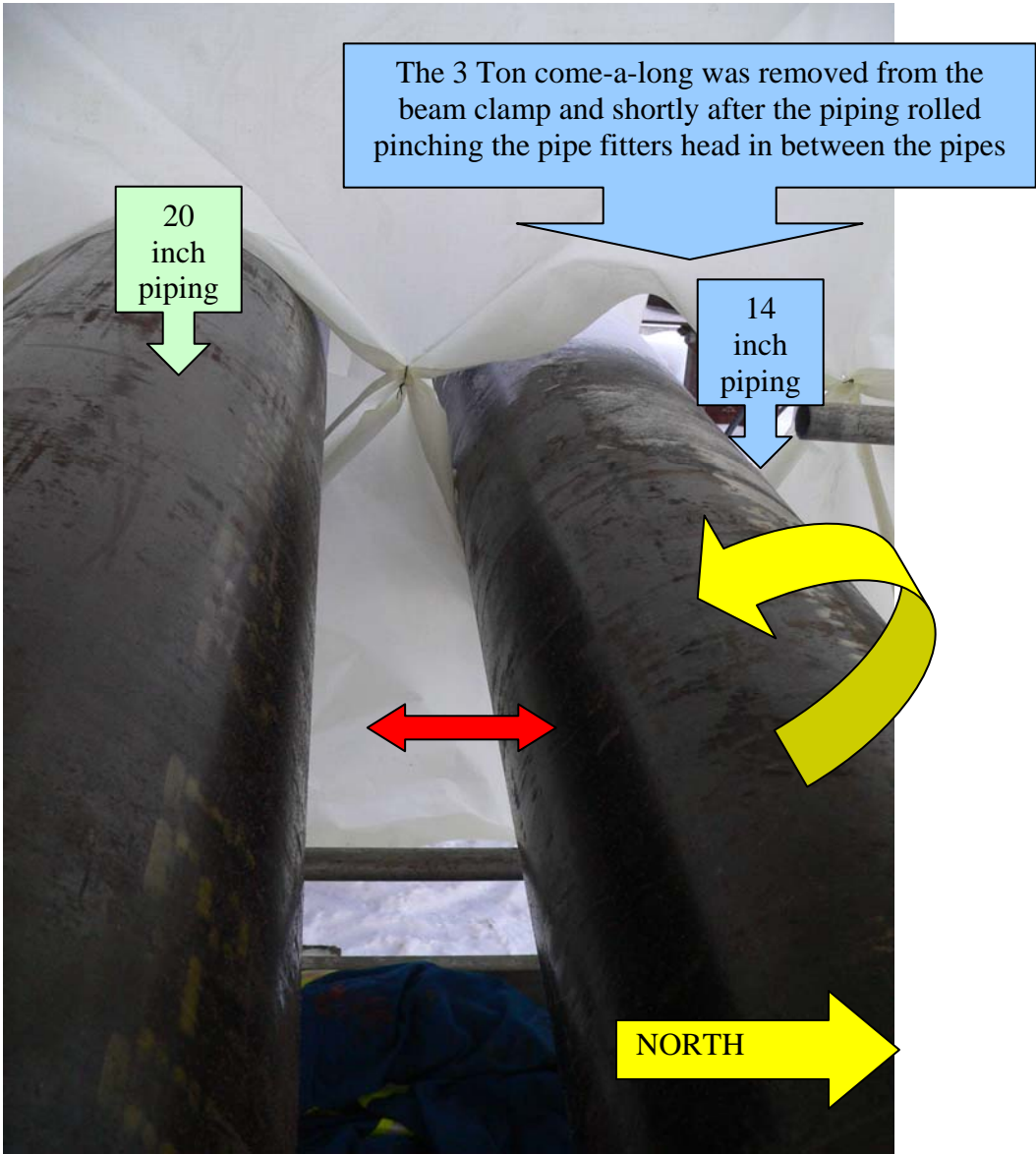
Photograph #4

Shows the two hoardings where the come-a-longs were used to pull the (14 inch 355 mm) diameter pipe spool out of alignment. The hoarding on the left (yellow arrow) was where the 1 ½ ton come-a-long was installed. The hoarding on the right (red arrow) was where the 3 ton come-a-long was installed. The incident occurred in the hoarding on the right (red arrow).



Photograph #5

Shows the east hoarding the Pipefitter was working in at the time of the incident (red arrow). The Genie man-lift was positioned under the flanges (yellow arrow).



Photograph #6 Looking west; the yellow arrow shows the direction the pipe spool rolled, fatally injuring the worker in between. Both the beam clamp and 3 Ton come-a-long was noted as disturbed from their original positions to care for the injured pipe fitter.



Photograph # 7 Shows the pipe spool dislodged from the cradle of the pipe shoe (yellow arrow). The pipe spool had tipped to the South.



Photograph #8 Looking east; shows the 57 m of 14 inch (355 mm) diameter pipe spool which rolled off the pipe shoes.



Photograph #9 Shows a method to secure pipe shoes called cable lashing seen being used in the pipe rack #939. These were not observed in use on the 14 inch (355 mm) diameter pipe spool # PW-ABA-14-9353 involved in the incident.



Photograph #10 Shows an expansion loop with various cable lashing used. These were not observed in use on the five pipe spool involved in the incident.



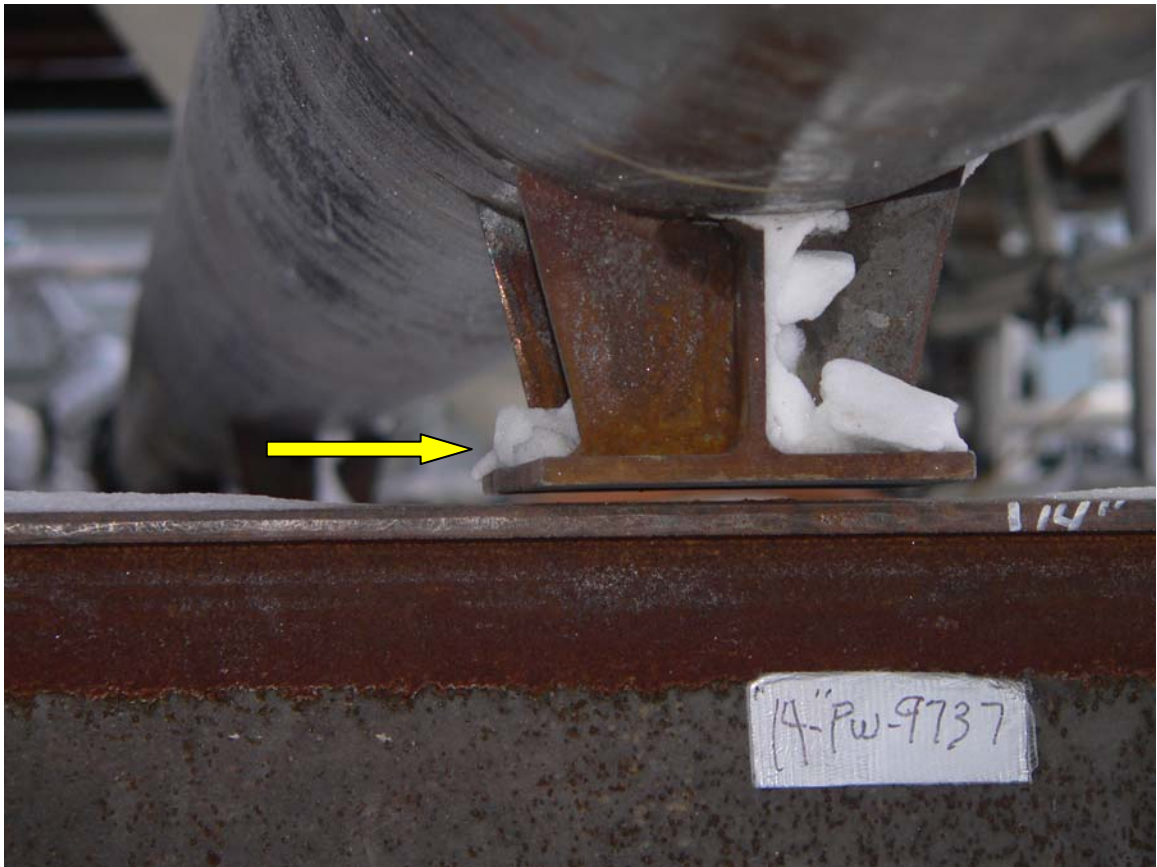
Photograph #11

Shows a method of securing shoes referred to as a "U" Clip. These were observed throughout the pipe rack #939. These were not observed in use on the 5 pipe spool involved in the incident.



Photograph #12

Shows the east end of the five pipe spools; 59 m in length on the east end of the pipe spool was noted as not being tack welded to the elbow.



Photograph #13 Shows pipe shoes on existing pipe spools of same diameter with gap (yellow arrow) between the shoe and the supporting I-Beam.