

Worker Dies from Burn Injuries

Date of Incident: 99 04 01

Type of Incident: Fatal

SUMMARY

A worker died as a result of burns he received when the caterpillar (cat) he was operating ruptured a pipeline, causing an explosion and fire.

The worker was excavating a dugout on a location selected by a landowner. The worker was using a ripper tooth to break up frozen ground. The ripper contacted a 410 mm pipeline which transports sweet natural gas. The pipeline was punctured causing a release of natural gas. The gas ignited, causing an explosion and fire.

The incident was investigated by the Royal Canadian Mounted Police (R.C.M.P.) and two Alberta Labour Occupational Health and Safety Officers.

The investigation established that:

- it was known that a pipeline(s) crossed the field; however, no effort was made to establish location(s).
- no worker questioned the possibility of an underground line.

To prevent a recurrence of this type of incident the landowner:

- has been made aware of Alberta 1-Call.

The contractor:

- amended his health and safety manual to identify the hazard and procedures for locating underground lines.
- developed a form/checklist for his operators to use when working for private landowners.

Alberta Labour:

- has reviewed the contractor's health and safety manual is working with Alberta Energy and Utilities Board and the Municipal District of Saddle Hills to provide an information session for residents of the area on the hazards of underground utilities.

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Section 1.0 FILE NUMBER

1.1 F-141816

Section 2.0 DATE AND TIME OF INCIDENT

2.1 99 04 01, 12:50

Section 3.0 DATE AND TIME OF INVESTIGATION

3.1 99 04 01, 17:00

Section 4.0 NAME OF INVESTIGATOR(S) (INTERNAL)

4.1 DEWHIRST, Kevin
Occupational Health and Safety Officer

4.2 CHRISTENSEN, Donna
Occupational Health and Safety Officer

Section 5.0 INCIDENT REPORTED BY

5.1 HUNTER, Susan
Alberta Environmental Protection

Section 6.0 DATE AND TIME INCIDENT WAS REPORTED

6.1 99 04 01, 14:26

Section 7.0 NAME AND ADDRESS OF PRINCIPAL STAKEHOLDER(S)

7.1 **Owner:** Private individuals

7.2 **Contractor:** Taves Contractors Ltd.
P.O. Box 27, Site 4, R.R. #1
Spirit River, AB T0H 3G0

7.3 **Employer:** Mudworks Contracting Ltd.
 P.O. Box 38, Site 2, R.R. #1
 Spirit River, AB T0H 3G0

Section 8.0 DESCRIPTION OF PRINCIPAL OWNER(S) OR EMPLOYER(S)

8.1 The land on which the incident occurred is owned by private individuals for the purpose of farming.

8.2 Taves Contractors Ltd. provides equipment and operators for wellsite preparation and road construction. The company also owns and sells gravel from a gravel pit. Clients consist mainly of oil and gas companies, but also include local governments and private individuals.

8.3 Mudworks Contracting Ltd. was a one-man operation at the time of the incident. The owner contracted his services out as an equipment operator and was operating the caterpillar (cat) at the time of the incident.

Section 9.0 LOCATION OF INCIDENT

9.1 The incident occurred on the NW of 5-82-9-W6M. By road, the site is approximately 65 km northwest of the Town of Spirit River.

Section 10.0 EQUIPMENT AND MATERIAL INVOLVED

10.1 The pipeline, Josephine Lateral Loop #2, is owned by Trans Canada Transmission (at the time of the incident – Nova Gas Transmission Ltd.). The line is a 410 mm pipe (16" NPS) containing sweet natural gas (see photograph #1) flowing at 6633 kpa (962 psi)± (measured 08:00 hrs Mountain Standard Time at Josephine Meter Station, approximately 19 km north of the site).

10.2 At the time of the incident there was a 250 mm (10" NPS) natural gas pipeline that parallels 12 m west of the 410 mm pipe (see photograph #4).

10.3 The flow of gas to the site of the incident is normally controlled by line brake control valves which are activated by pressure sensors. In the case of a line rupture these automated valves function as an Emergency Shut Down to shut off the flow of gas. This section of 410 mm line is controlled by four automated valves: two 500 m north of the site, and two 6.5 km south of the site.

- 10.4 The cat involved was a 1987 model D8N, S/N 9TC01715. It was equipped with a dozer blade and a single hydraulically controlled ripper tooth (see photograph #2).
- 10.5 The NW of 5-82-9-W6M was being used as pasture land for livestock. The quarter was snow covered at the time. Under the snow, ground cover consisted of grasses, sedges and scattered brush/willows.

Section 11.0 NAMES OF OTHER INVESTIGATORS (EXTERNAL)

- 11.1 Constable [].
Royal Canadian Mounted Police
Spirit River Detachment
- 11.2 Trans Canada Transmission
Fairview and Calgary

Section 12.0 NARRATIVE DESCRIPTION OF INCIDENT

- 12.1 Taves Contractors Ltd. agreed to provide a cat for the construction of two dugouts on private land. On hearing that the cat would be in the area, a Taves employee (the spouse and joint owner of NW5-82-9W6) requested the cat to construct a dugout on their land.
- 12.2 On March 31, the D8N cat was walked across country and left at the approach to NW5 by another operator (see diagram #1).
- 12.3 On April 1 at 0800 hours, the landowner, the operator, and a Taves Contractors Ltd. employee met at the cat. The landowner selected a low/wet area in the field as a suitable location for the dugout. The Taves Contractors Ltd. employee explained the most efficient way to construct the dugout.
- 12.4 The landowner and the Taves employee left the site. The cat operator ploughed snow off the site to the east and west sides of the dugout. He then changed direction and started to excavate, pushing dirt north and south.
- 12.5 The operator used the ripper to break up the frozen ground. Marks on the pipe indicate the ripper contacted the pipe at two spots north of the rupture.
- 12.6 At 12:50 hours the ripper contacted the pipe a third time, causing the release of sweet natural gas. The operator realized what had happened and made his way off the machine. The natural gas ignited.

- 12.7 The landowner heard an explosion, saw the fireball and drove from his home to the site, approximately 4.8 km away. Several community residents were already on site. The intense heat prevented approaching the fire (see diagram #1). The landowner phoned Taves Contractors Ltd. to notify them.
- 12.8 Valves on the Trans Canada Transmission pipeline activated due to the pressure drop and shut off the gas from the north. One valve located 6.5 km south of the incident shut in but a second valve did not activate.
- 12.9 At 13:05 hours Taves Contractors Ltd. called 911. An ambulance was dispatched from Spirit River and other emergency responders were notified.
- 12.10 At 13:15 hours Trans Canada Transmission was notified and dispatched operators from Spirit River.
- 12.11 At 13:43 hours the R.C.M.P., the Savannah Fire Department, ambulance, and Trans Canada operators arrived on site. The fire was diminishing; however, intense heat still prevented approach to the site. Trees south of the incident blocked the site lines to parts of the dugout area (see diagram#1).
- 12.12 At 13:55 hours a Trans Canada operator manually closed in additional valves at the valve station. It was not clear which line was ruptured so all valves on site were closed.
- 12.13 The fireball receded enough to allow onlookers to drive past the site.
- 12.14 At 14:25 hours an onlooker saw the cat operator lying in the snow south of the dugout area.
- 12.15 At 14:30 hours rescuers reached the operator. At 14:40 the operator was transported from the site.
- 12.16 The fire went out at 16:15 hours.

Section 13.0 CONCLUSIONS

- 13.1 The immediate cause was contact of the pipeline by the ripper.
- 13.1.1 There was a failure to establish the location of the underground pipeline(s).
- 13.1.2 The landowner knew a pipeline angled across his land but believed the line was further to the east.

- 13.1.3 The cat was driven to the site the night before by another Taves Contractors Ltd. employee. The three people on the site that morning had not driven by pipeline signs/markers just a few hundred metres north of the site when accessing the cat (diagram # 1).
- 13.1.4 The Taves employee and the operator had used the cat to dig a dugout for two days prior to this incident. In that case the landowner knew there were no lines present, and had cleared the site prior to excavation. No line locates were done that might have brought the concern to the operator's attention.
- 13.2 The work standards for this job were inadequate.
- 13.2.1 All three people on the site that morning had oilfield experience or had operated heavy equipment in an oil/gas field. No one questioned the presence of a pipeline.
- 13.2.2 Taves Contractors Ltd. has a safety manual and employees/employers receive orientation. The manual does not contain policies/procedures for pipeline locates.
- 13.2.3 It cannot be confirmed that Taves Contractors cautioned the landowner(s) to locate pipelines prior to excavation.
- 13.2.4 The intensity of the fire delayed the rescue of the operator.
- 13.3 While not a cause of the incident, it is not clear what effect failure of the one automated valve on the Trans Canada pipeline had on the outcome.
- 13.3.1 If the automatic valve had functioned, there would have been time required for the gas in the 6.5 km section of line between the site and the valve to burn off. The investigator was unable to determine how much time the gas burn-off would have taken.

Section 14.0 FOLLOW-UP/ACTION TAKEN

- 14.1 **Industry**
- 14.1.1 Taves Contractors Ltd. has revised their health and safety program to include a section on pipeline locates.
- 14.1.2 Taves Contractors Ltd. has developed a procedure and checklist for their operators when working with non-industry/private landowners.

14.1.3 Trans Canada Transmission tested the automatic valve that did not close and found it operational.

14.2 **Alberta Labour**

14.2.1 The investigator reviewed the incident with the landowners to make them aware of Alberta 1-Call.

14.2.2 The investigator reviewed Taves Contractors Ltd. Health and Safety Manual and provided input to the company.

14.2.3 The investigator will work with the Energy and Utilities Board and the Council of the Municipal District of Saddle Hills to organise a presentation on locating underground utilities.

Section 15.0 INJURY SEVERITY

15.1 Fatal

Section 16.0 SIGNATURES

[original signed]

Section 17.0 ATTACHMENTS

Attachment A	Photographs
Attachment B	Diagram



Photograph #1

Taken looking northeast (see diagram #2), this photograph shows the 410 mm pipe entering the picture from the north (left). The cat is sitting on the other end of the pipe as indicated by the red arrow [lower right]. The green arrow [upper left] shows the ground level at which the cat would have been working. It is believed the cat was working from left to right (north to south).

Photograph Taken By
Kevin Dewhurst
99 04 01



Photograph #2

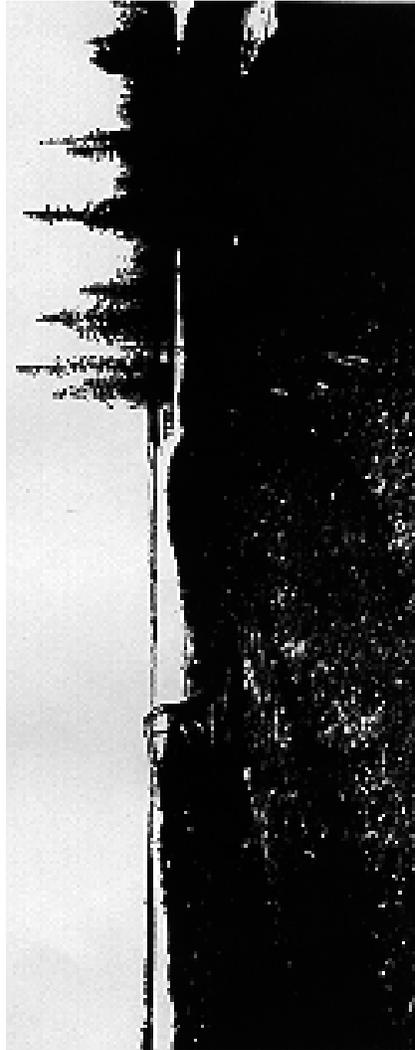
Taken looking southeast (see diagram #2), this picture shows the D8N cat complete with dozer and ripper. The red arrow indicates the exposed end of the southern end of the pipeline under the cat's track. Debris in the foreground is part of the pipeline that was blown away.

Photograph Taken By
Kevin Dewhurst
99 04 01



Photograph #3: This photograph was taken looking northeast (see diagram #1) at approximately 14:15 hours (99 04 01) by an individual at the scene. The blue arrow indicates the cat. The rupture point is immediately north (left) of the cat. It appears the gas is venting from the southern section of the pipeline.

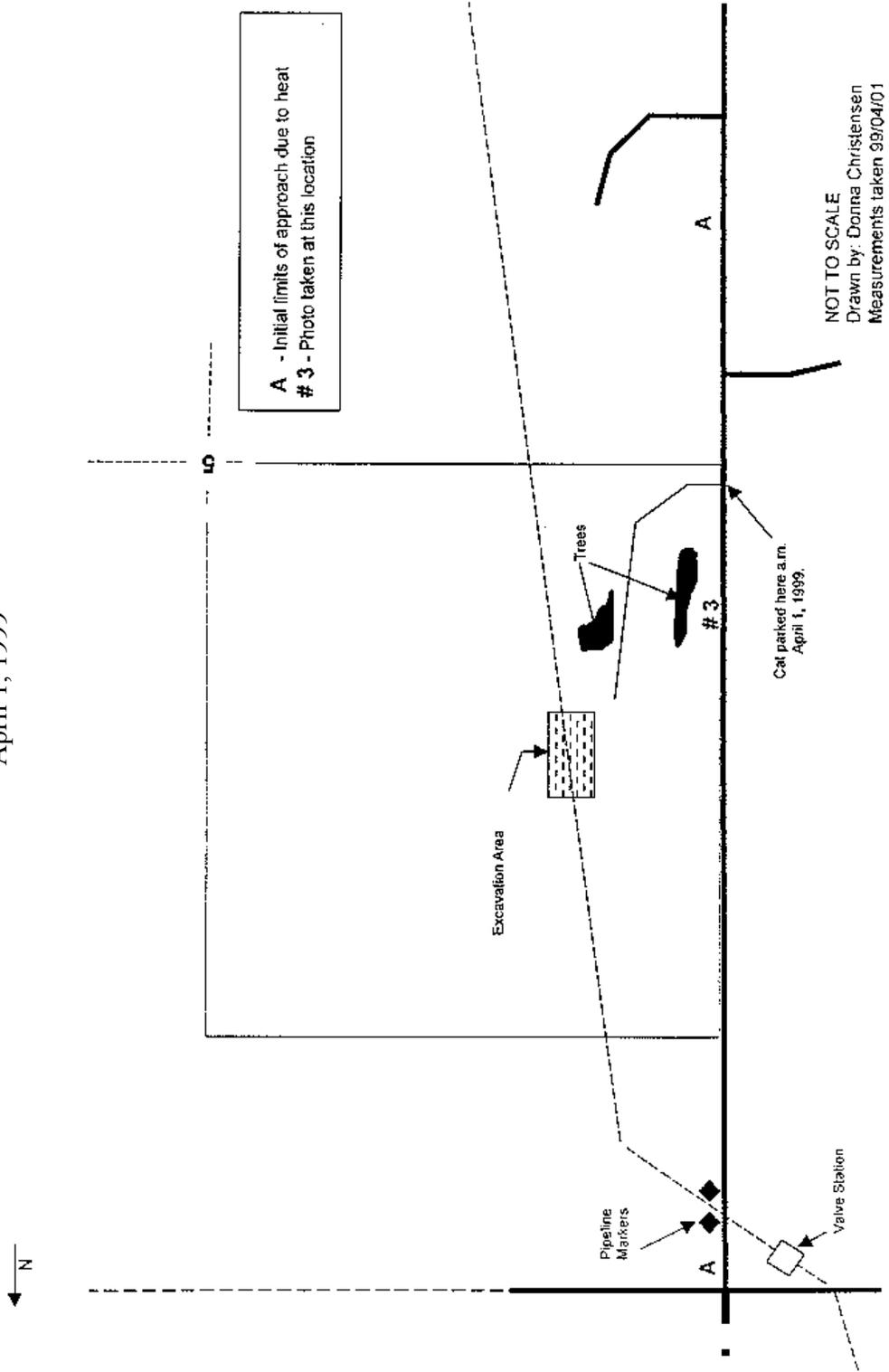
Photograph Taken By
Kevin Dewhurst
99 04 01



Photograph #4: This photograph was taken looking southeast (see diagram #2). The red arrow indicates the area behind the dirt berm where the operator was found. Dirt windrows indicate the cat was working north and south. Yellow flagging at the right center of photograph shows the location of the 250 mm pipeline. This parallels the 410 mm pipe visible near the cat (green arrow).

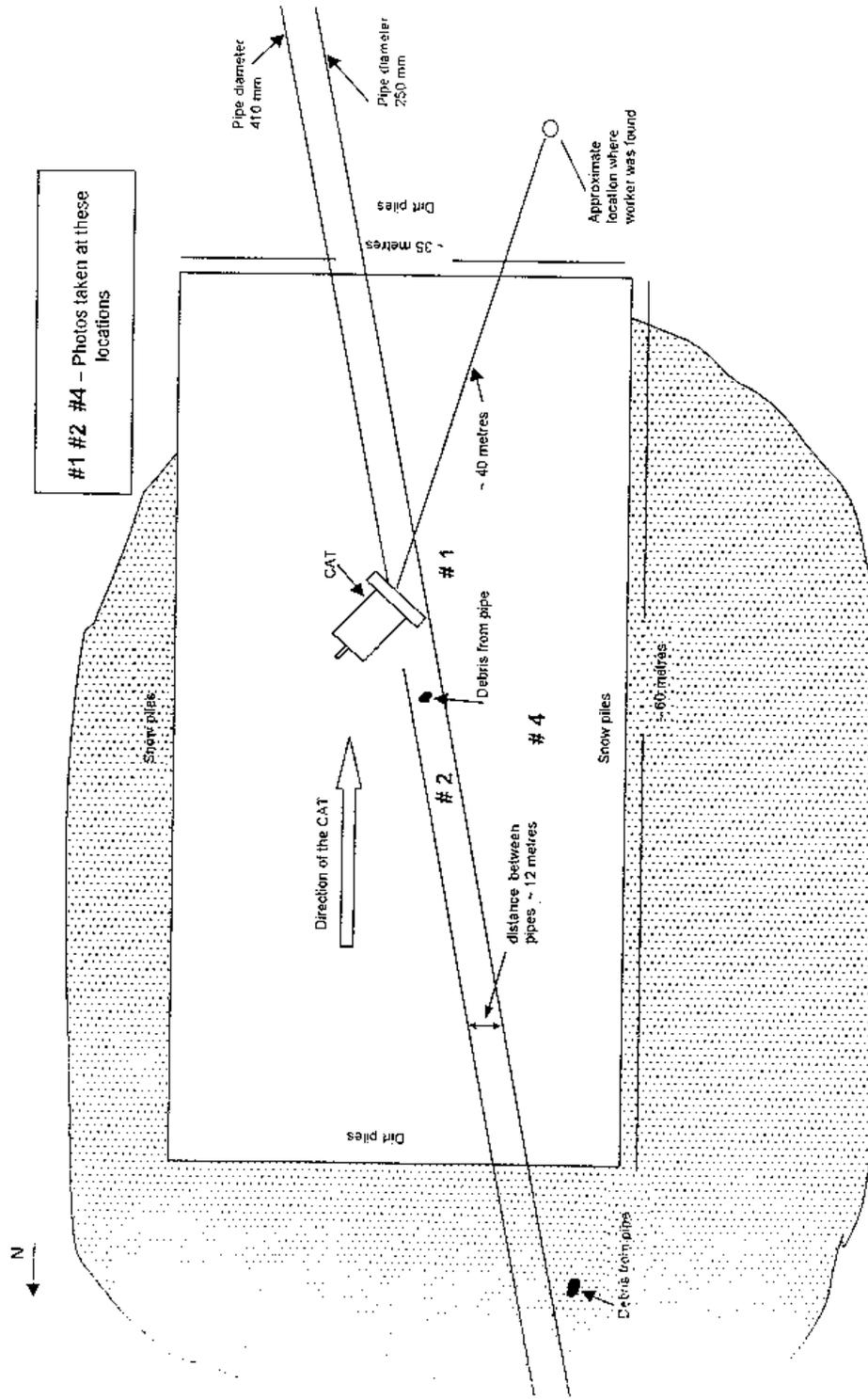
Photograph Taken By
Kevin Dewhurst
99 04 01

Diagram 1
Fatality Investigation
NW5-82-9-W6
April 1, 1999



NOT TO SCALE
Drawn by: Donna Christensen
Measurements taken 99/04/01

Diagram 2
 Fatality Investigation
 NW5-82-9-W6
 April 1, 1999



NOT TO SCALE
 Drawn by: Donna Christensen
 Measurements taken 99/04/01