



Keeping the water flowing

Response to a catastrophic well failure
in the spring of 2013

PNWS-AWWA 2014 Conference
Jim Markley, P.E.
Coeur d'Alene Water Department

Coeur d'Alene, Idaho







Coeur d'Alene Water System

- 45,000 population
- 18,000 accounts
- 9 wells
- Total pumping capacity of 37 mgd (25,700 gpm)



Landings Well

- Drilled in 2005
- 410 Feet deep
- Pumping capacity of $\approx 3,100$ gpm
- 500 HP motor
- 12" column pipe
- 24" casing
- Static water level @ 270 feet
- 50 feet of screen



Landings Well rehab

- Project started in April 2013
- Pump replaced
- Several sections of column pipe and line shaft replaced
- All of the spiders replaced

- Well back on line in mid-April



Catastrophic failure: Landings Well

What happened on May 17th 2013

Line shaft 'corkscrewed' and separated

Column pipe separated

Pump crashed to the bottom of the well

"Arc flash" inside the building

12" Column pipe 'telescoped'

Motor superheated

Discharge head flange cracked

2 1/16" Dia. line shaft

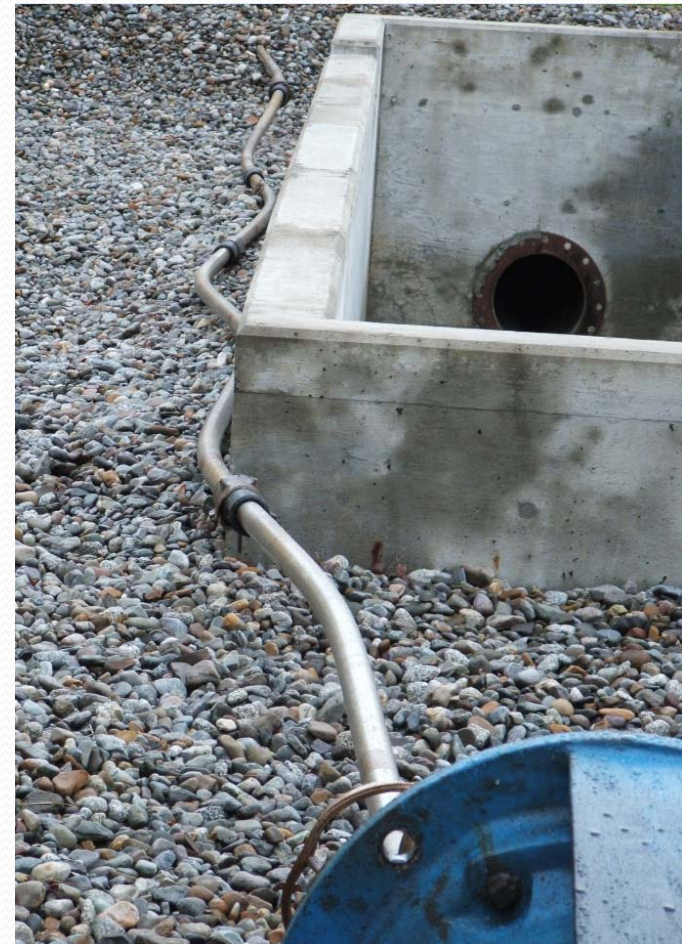
Email sent May 20th

From: MARKLEY, JIM
Sent: Monday, May 20, 2013 9:07 AM
To: INGALLS, JON; TYMESEN, TROY
Cc: PICKEL, TERRY; HOLTON, DION
Subject: FW: LANDINGS SHAFT

The stainless steel line shaft is supposed to be straight to a tolerance in the thousandths of an inch. Here is the line shaft after we removed it from the well. I can tell, just by looking, that it is out of tolerance.

Jim

Jim Markley, P.E.
City of Coeur d'Alene, Water Superintendent
208 415 0418
JIMM@cdaid.org





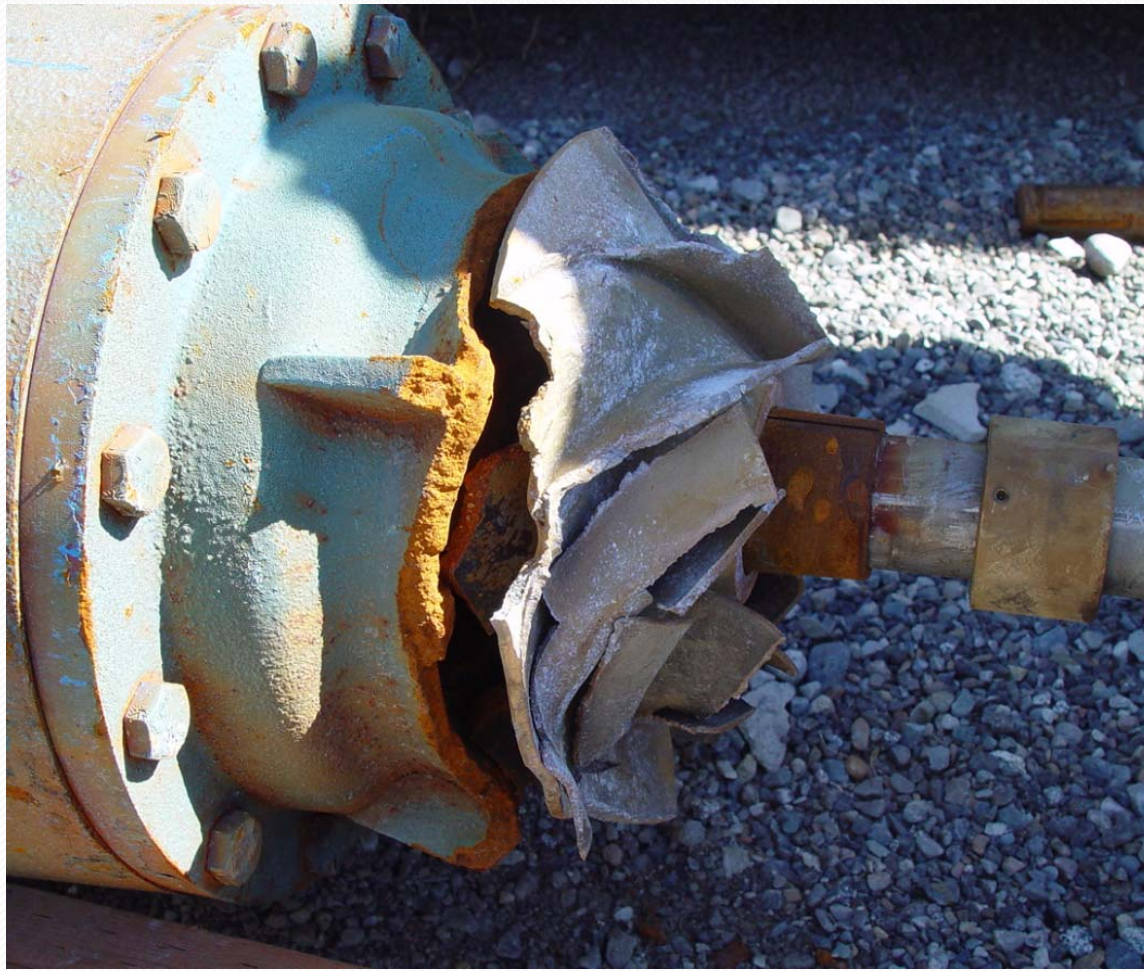
Pump being pulled from the hole



Notice the missing pump bowls



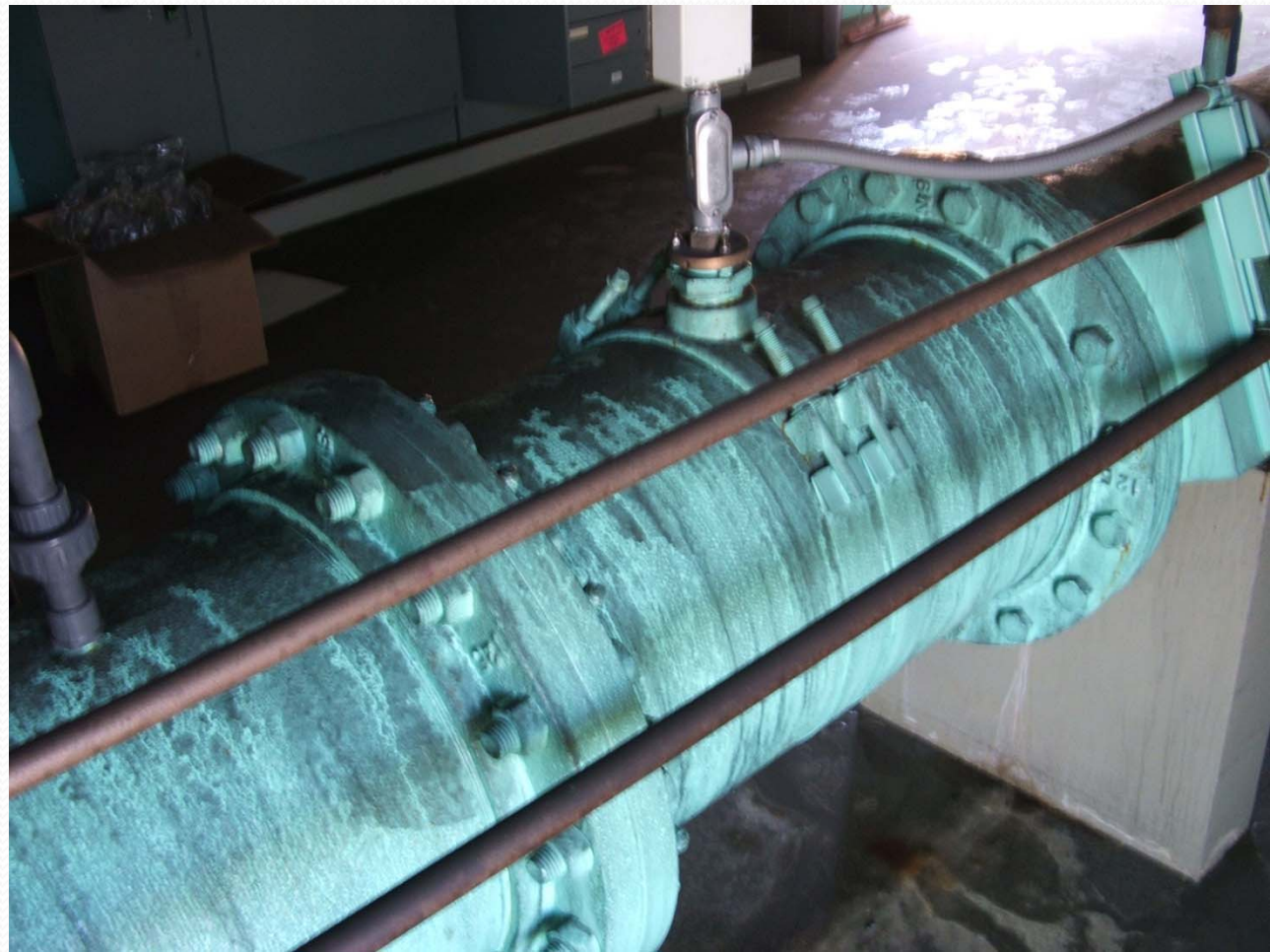




Pieces of the pump bowls



Soot on discharge pipe



Cla-Valve covered in soot



Motor Oil



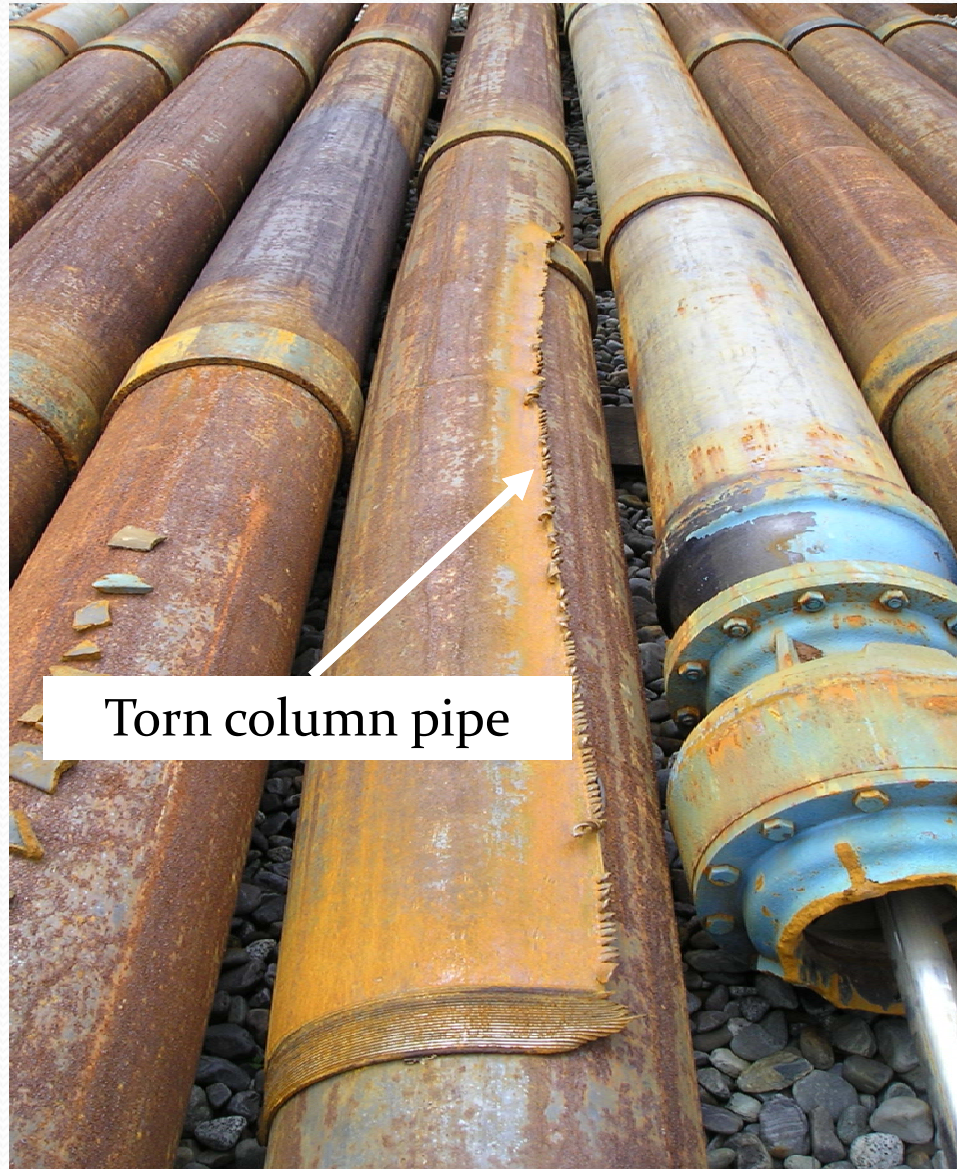
... everywhere!



Discharge head ... covered in oil



Telescoped column pipe



Torn column pipe

The motor



Top motor bearing before removal



Top motor bearing



Cracked discharge head flange





First steps

Turned on the Hanley Well

Tightened the “set points” at the reservoirs

Advised the City Council

Advised the Idaho Department of Environmental Quality

Advised the city’s insurance company



We developed a ‘mantra’

man·tra (mntr, mn-)n.

1. Hinduism A sacred verbal formula repeated in prayer, meditation, or incantation, such as an invocation of a god, a magic spell, or a syllable or portion of scripture containing mystical potentialities.

2. A commonly repeated word or phrase.

“Get the well back on-line and pumping water”



Second steps

Met with Contractor

Began trying to shorten up lead time for components

Asked for and received a 'declaration of emergency' from Council

Determined that we could be back on-line before peak summer demand



From: MARKLEY, JIM

Sent: Friday, June 07, 2013 8:55 AM

Cc: *WATER DEPT; INGALLS, JON

Subject: HEADS UP

From Jim Markley: Insurance Adjusters at the Landings Well: We had a *gaggle* of insurance adjusters and experts at the Landings Well yesterday. For those of you wondering, a *gaggle* equals about 25. Their purpose was to review all of the physical evidence and release the site so we could begin cleanup in preparation of getting the well back on-line. The motor was sent to Spokane and today will be broken down to ascertain the cause of its failure. A few parts at the site will be sent out for further inspection (specifically a segment of the line shaft for metallurgic examination) and the rest will be moved, by us, to either our Honeysuckle site or Ramsey Road. Final liability will be determined around a big table or in a courtroom. Our primary goal, of course, is to get the well back in service. Now that the site has been released we can begin cleanup, especially in the building. We will get the used parts out of the way and as the replacement pieces arrive we can stage them there, ready for installation.

Jim Markley, P.E.

City of Coeur d'Alene, Water Superintendent

208 415 0418

JIMM@cdaid.org

Insurance adjusters inspecting the site on June 6th



Motor disassembly on June 7th



Base of motor showing melted plastics and resins





The next step

- Replacement components ordered.

Re-installation begins

Components arrived the last week of June.
Reassembly started on July 1st



Installation in progress



Back on-line!!

The well went back on-line on July 11th. Phenomenal!





BACK ON-LINE!!

Coeur d'Alene City Council

Heads Up!

July 11, 2013

EARLY EDITION

From Dion Holton: WONDERFUL NEWS: THE LANDINGS WELL IS BACK ON!!! As previously discussed, the Landings Well suffered catastrophic failure on May 17th. Through the hard work and combined efforts of City staff and R.C. Worst, the well is now back in service. During the time the well has been off line, we have just been able to keep up with demand. With it running we should easily be able to meet the water needs of our customers through the rest of the summer.

Repairs complete!





THANKS!!

Terry Pickel and Ken Worst for all of their efforts including locating components with short lead times .

R. C. Worst for standing behind their work.

Trevor Arnold for handling the insurance side of the situation.

Everyone who put extra time and energy into making the repair successful.

When you turn on the faucet and
get this ...



You can thank these people!



Questions ?





What Caused the Failure? Theories...

- Line shaft separated?
- Column pipe unscrewed?
- Pump seized up?
- Motor seized up?
- Bad power?
- Other?



Previous lessons verified

Lots of panic ... not so good.

A little bit of panic ... not so bad.





From: PICKEL, TERRY

Sent: Tuesday, June 04, 2013 12:03 PM

To: *HEADS UP

Subject: HEADS UP!! Landings Well update.

From Terry Pickel: Landings Well Update: Today RC Worst is onsite working to retrieve debris from inside the well. This work is expected to take several days. As of 10:30 this morning they had removed approximately 100 lineal feet of 1" PVC conduit from the bottom of the well. About another 240 feet is left along with some transducer cable and the last stage of the pump. An insurance representative is onsite recording the retrieval. On Thursday June 6th, the Landings Well site will be visited by approximately 10 – 20 insurance representatives, engineers and forensic inspectors to thoroughly review the existing onsite evidence. This is expected to take from 9:00 am until approximately 5:00 pm. The site should then be released for cleanup. The damaged motor will be transported to K&N Electric in Spokane for disassembly and inspection on Friday June 9th. The pump will likely be transported to RC Worst for further disassembly and inspection. All replacement components are expected to arrive the week of June 21st with installation to begin the following week. We expect to have the pump operational by the end of June.

Terry W. Pickel

Assistant Water Superintendent

City of Coeur d'Alene







The future...

The goal is and has been to be able to meet the peak day demand with the largest well out of service...

...we are close but not quite there.

New well

Atlas at Hanley

