From: Cherry, Brian K
Sent: 12/16/2013 3:50:44 PM
To: Florio, Michel Peter (MichelPeter.Florio@cpuc.ca.gov) (MichelPeter.Florio@cpuc.ca.gov)
Cc:
Bcc:
Subject: FW: Golf Links Rd. Gas Event Update

Mike – Paul, the General and Liza M. have copies of this. It is preliminary but I thought you'd might like to see it given it happened in your neighborhood.

From: Doll, Laura
Sent: Friday, December 13, 2013 5:47 PM
To: Cherry, Brian K; Allen, Meredith
Subject: FW: Golf Links Rd. Gas Event Update

This is obviously not for distribution yet, and I am trying to get them to stop using the term "overload" as it is easily misconstrued. It does NOT mean overpressure or anything like that. It means that something OUTSIDE the pipe put pressure on it. That something could be third party damage, or fault action. One working theory right now is that the water utility did something that severed the line. The testing that has been done thus far makes clear that this was NOT corrosion, and the pipe material is ok, and the construction/installation (in 1946) is ok. And our records are consistent with what's in the ground. All good news.

Still no idea what the source of ignition was.

From: Yura, Jane
Sent: Friday, December 13, 2013 5:40 PM
To: Yee, Frances; Doll, Laura
Subject: FW: Golf Links Rd. Gas Event Update

From: Thierry, Raymond
Sent: Friday, December 13, 2013 5:34 PM
To: Gas Ops Sr. Leadership Team; Stavropoulos, Nickolas; Singh, Sumeet; Cowsert Chapman, Christine
Subject: Golf Links Rd. Gas Event Update

Here is an update on the direct cause failure analysis being performed by Exponent Engineering. The attached slide deck provides an excellent overview.

Here are the key findings:

•□□□□□□□ The component that failed is a 4" diameter, 90 degree manufactured steel elbow that was installed in 1946.

•□□□□□□□ Immediately upstream the failed elbow, a 3" diameter tee was installed in 1965 that fed the Fontaine Street main.

•□□□□□□□ Downstream of the failed elbow, the 4" line was cut and capped in 1987 and an upward transition was added to feed a plastic line that continued down Golf Links Road.

•□□□□□□□ The construction documents from 1946 and 1987 accurately reflect the as-installed conditions.

•□□□□□□□ The subject elbow fracture was caused by a single, overload event

•□□□□□□□ Brittle (cleavage) fracture morphology was observed

•□□□□□□□ No evidence of progressive fracture (such as fatigue or stress corrosion cracking) was observed

•□□□□□□□ The fracture was not associated with a mechanical, corrosion-induced, or metallurgical defect

•□□□□□□□ The elbow exhibited the expected "ferrite-pearlite" microstructure

•□□□□□□□ The elbow hardness was measured to be 193 HV, roughly equivalent to a UTS of 92 ksi

The next phase of our investigation will focus on the root cause of the overload event the resulted in the elbow fracture.

Raymond Thierry

415-793-4037