BRYANT CONSULTANTS

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Preliminary Assessment Report
February 28, 2018

Bryant Consultants, Inc. (BCI) was retained by Atmos Energy due to the sudden and unexplained leaks concentrated in a narrowly defined area approximately three thousand feet to the east and west of Marsh Lane and within the boundaries of Walnut Hill Lane to the north and W. Northwest Highway to the south, to identify a potential cause for the leaks and assist in developing a response. This letter report summarizes our preliminary assessment.

The area where the leaks occurred is where variable geological formations are in close proximity. More specifically, the defined area represents the meeting point of an "Eagle Ford Shale" formation, the Quaternary "Alluvium" and the "Austin Chalk" formation. Each of these formations have different soil properties and swell characteristics.

The Austin Chalk and Eagle Ford formations have high soil swell potentials, with the Eagle Ford Shale's expansive potential being much higher than that of the Austin Chalk. The area may also have a thin layer of Quaternary terrace deposits at the surface that masks the contact between the two formations. The difference in expansive potential between the underlying potentially highly expansive soils can cause substantial differential soil movements. The close proximity of these two formations creates a geological "hinge-point" where the land generally to the west of Marsh Lane may move more relative to the land to the east of Marsh Lane where more uniform and stable soil and moisture conditions are generally encountered. The recent extended period of rain has likely exacerbated this movement. Further, the hydrogeological conditions allowing moisture migration near the contact of these two formations also is a likely causative factor. This differential movement exacerbated by the rainfall infiltration and groundwater migration over this recent period led to forces that caused unanticipated external loadings on the piping within this system. Due to the juxtaposition of the geological contact, soil conditions, the magnitude and migration of rain fall, infiltration, run-off and sub-surface water seepage and flow, and the system characteristics, it is our opinion based upon the evidence available at this time that the longitudinal forces that were added to the system could not have been readily modeled, predicted, anticipated, or foreseen.

Further, because these areas were saturated, these saturated soil and pooling water could potentially mask these failures for a period of time by holding the gas in place and preventing detection. As the area continues to dry, the moisture dissipates and the gas is allowed to migrate to the surface, making the gas easier to detect, and leading to the increased detection of leaks recently, after the rain event.

While there is still more work to do to confirm this theoretical model, this is the most realistic causal mechanism based upon the evidence reviewed to date. Based on the available evidence, there is no second-best theory at this time.

Sincerely,

John T. Bryant, Ph.D., P.G., P.E, CPG, D.GE
President/CEO
[redacted]
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