



CITY OF GALLUP

Drinking Water Distribution
Assessment

For

Gallup City Council

Jan 22, 2019

- ▶ Purpose
- ▶ Predicted impacts of current pipe scales in Gallup distribution system with San Juan River water
- ▶ Identify best suited water quality parameters that will have least impact on Gallup distribution water mains
- ▶ Recommendations for transition to new water quality

AGENDA



Phase I

- Conduct a distribution assessment
- Review compliance and process control historic data
- Review hydraulic model
- Conduct blending study and different blending scenarios
- 6-8 months

Phase II

- Prepare distribution system for new water
- Conduct Unidirectional flushing, velocity testing, flushing plan
- Swabbing or ice pigging
- Pipe replacement
- Conduct Pipeloop studies
- Design and install additional treatment
- 1 – 2 years

Phase III

- Develop distribution and entry point monitoring plan
- Electronic monitoring system
- Sample stations
- Begin monitoring before introducing new water quality
- Develop monitoring and action team
- Monitoring staff and equipment, flushing team, training.
- 6 – 12 months

WATER INTEGRATION

- ▶ Identify the nature of the current scales on water mains
- ▶ Provide a general assessment of water quality degradation as the water travels from the water treatment plants.
- ▶ Compares compatibility of the San Juan River water quality, based upon United States Geologic Survey(USGS) data, to the current water quality at the Santa Fe and Yah-Te-Hey entry points,
- ▶ Attempt to establish recommended water quality parameter ranges at the new San Juan Lateral entry point to minimize destabilization of current pipe-scales.



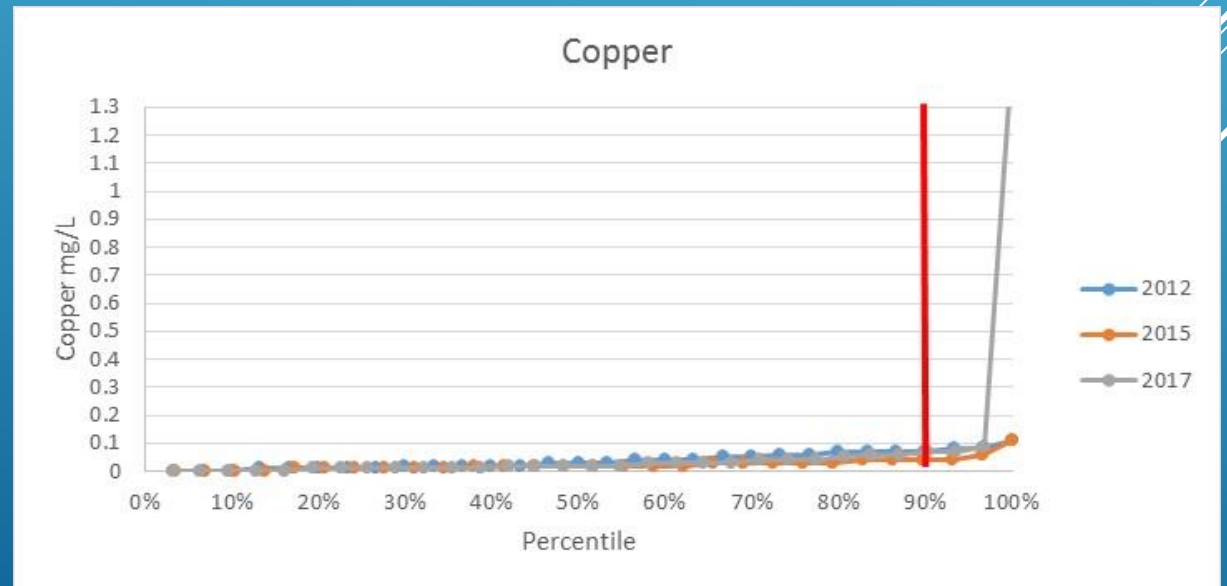
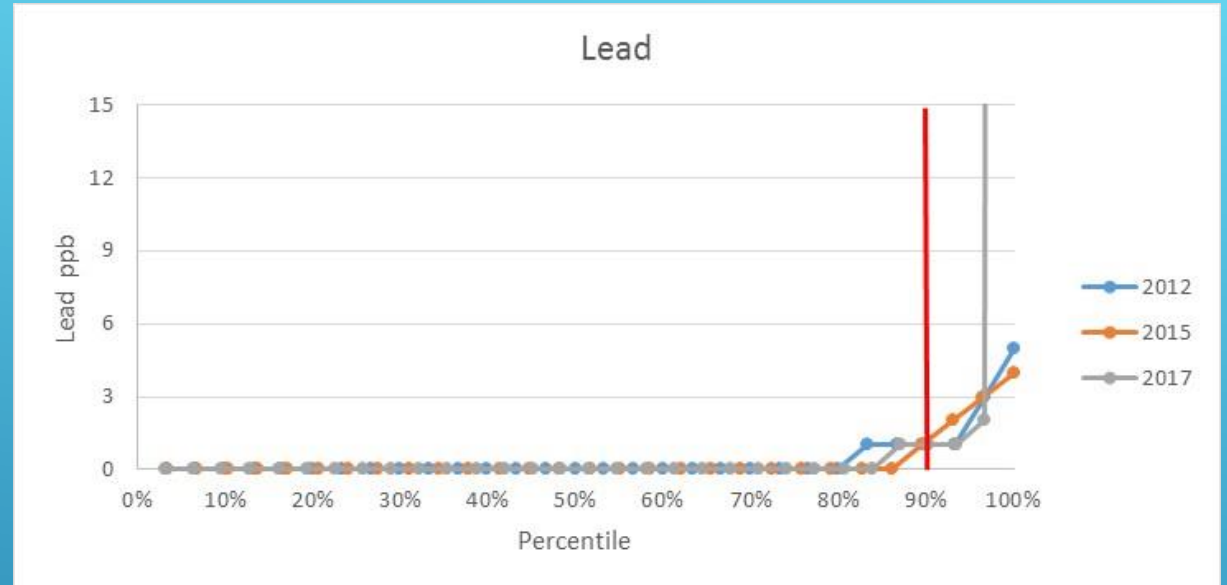
PURPOSE OF STUDY

- ▶ 170 miles of mains
- ▶ PVC/C900 – 35%
- ▶ Asbestos cement – 32%
- ▶ Cast iron – 12%
- ▶ Ductile iron (Lined) – 13%
- ▶ 2-inch galvanized iron pipe – 1%
- ▶ Copper – 1%
- ▶ Steel – 0.5%
- ▶ Unknown – 5%

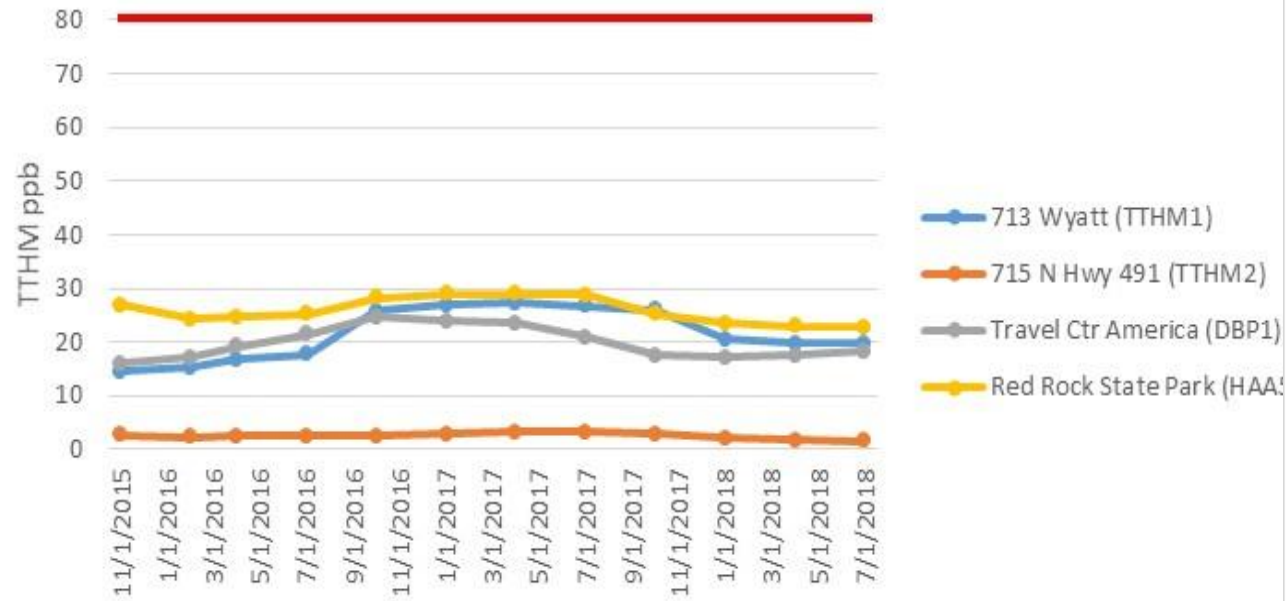
DISTRIBUTION PIPE MATERIAL

LEAD AND COPPER SUMMARY

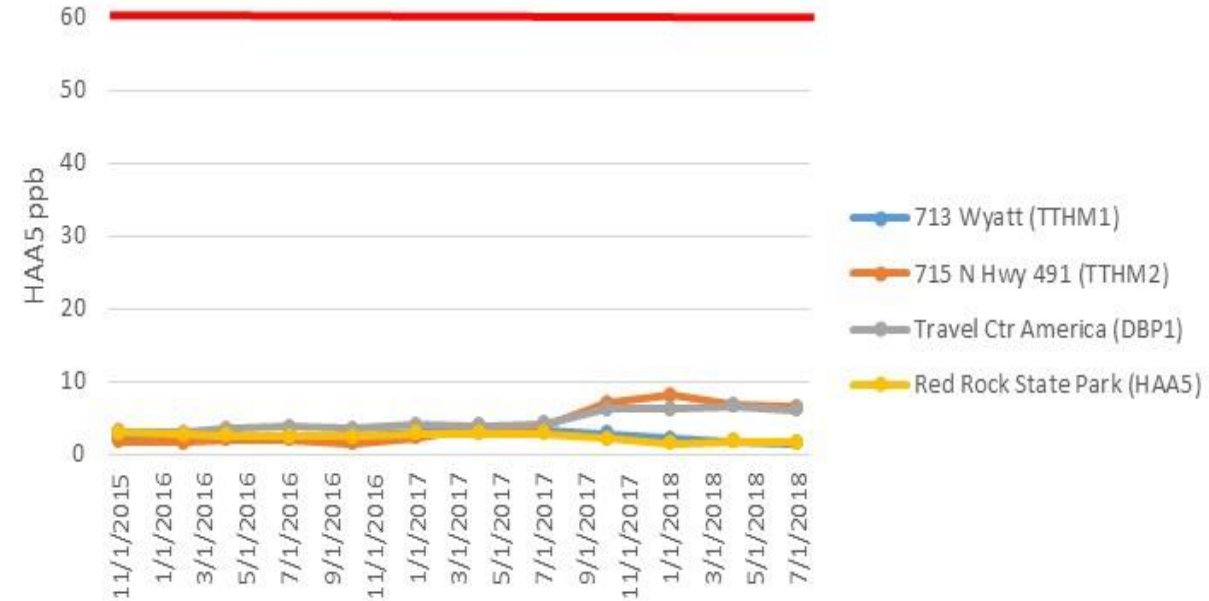
		Gallup System	Action Level
2012	Lead, ppb	1	15
	Copper, ppb	70	1300
2015	Lead ppb	1	15
	Copper, ppb	40	1300
2017	Lead, ppb	1	15
	Copper, ppb	70	1300



TTHM LRAA



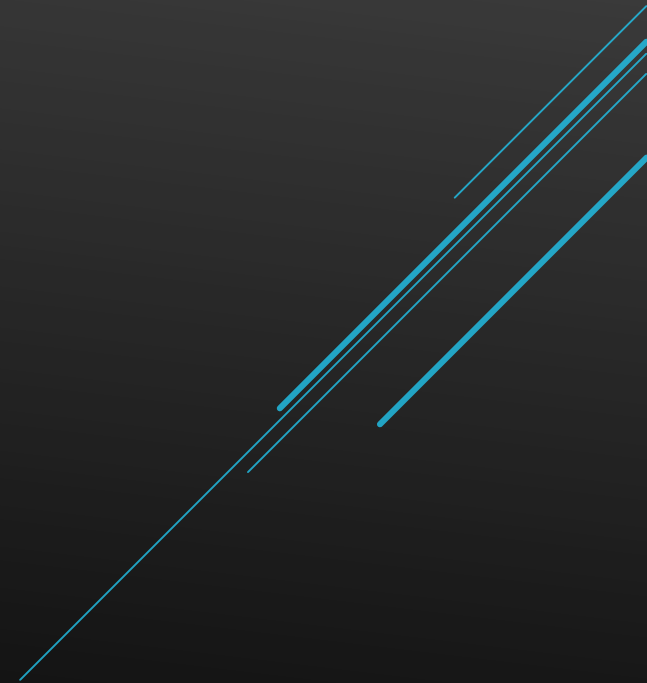
HAA5 LRAA



DISINFECTION BY-PRODUCTS

TOTAL COLIFORM

- ▶ Only one positive coliform event in last 5 years due to a compromised sample station.



66% of samples contained elevated iron and manganese

Samples that had elevated iron contained elevated manganese

Cast iron pipes had highest concentrations of iron and manganese

Cast iron pipes from 1920s – 1930s had most sensitive scales (due to physical disruption)

Iron and manganese both major sources for discolored water complaints

Calcium scale exists in small pockets

SUMMARY OF DISTRIBUTION WQ ASSESSMENT

01

**Monthly average target
pH – 8.0 to 8.3 pH units**

02

**Alkalinity concentration -
> 100 mg/L**

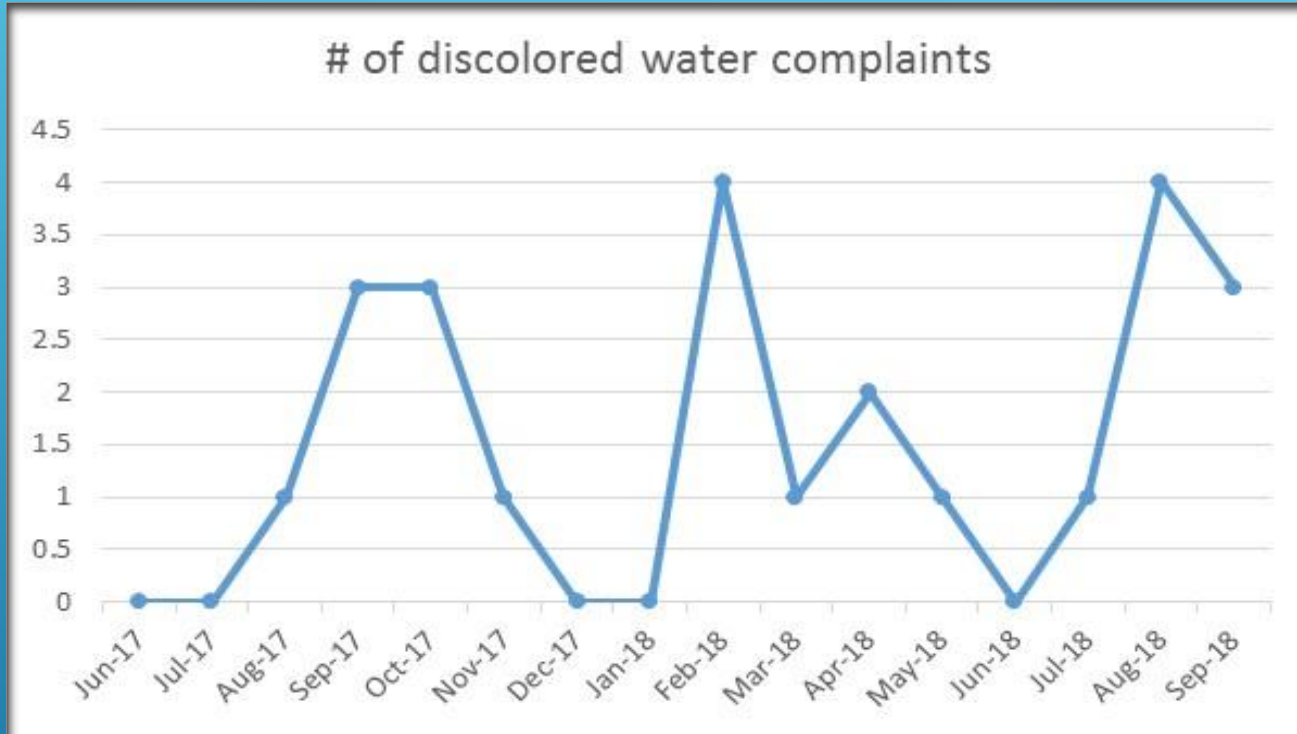
03

**Calcium Carbonate
Precipitation Potential
(CCPP) monthly average
target - 4 to 10 mg/L as
CaCO₃**

04

**Monthly average free
chlorine residual – 2.1 ±
0.2 mg/L**

**RECOMMENDED FUTURE WATER QUALITY
PARAMETERS (BASED ON SAN JUAN RIVER WQ)**



- ▶ The average number of monthly discolored water complaints over the past two years is 1.5.
- ▶ Based on 5900 service connections, the rate of discolored water complaints is 0.025%.
 - ▶ On par for stable distribution system

DISCOLORED WATER COMPLAINTS

01

Conduct pipe-scale analysis on a couple of old cast iron pipes (prior to 1940)

02

Conduct velocity tests to determine optimal flushing velocities to remove iron and manganese out of cast iron mains without breaking too many tubercles causing a bleeding effect.

03

Based on velocity tests, develop a unidirectional flushing plan/program. – Phase II

ADDITIONAL RECOMMENDATIONS

Conduct a pipeloop study – Phase II

- Always a degree of uncertainty when changing from groundwater to surface water
- Conduct pipe-loop study using extracted galvanized pipe from customer's premise plumbing in areas where the old cast iron main exists or 2 to 4 inch cast iron mains.
- Study should also look at impacts of additional chemical treatment

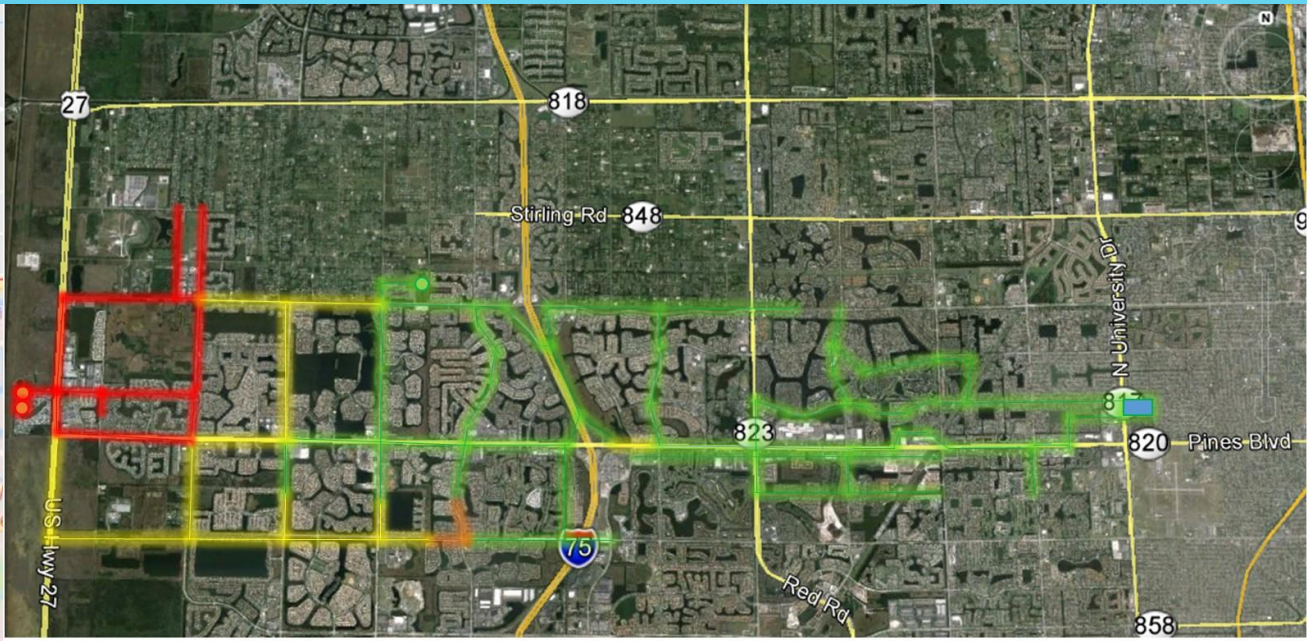
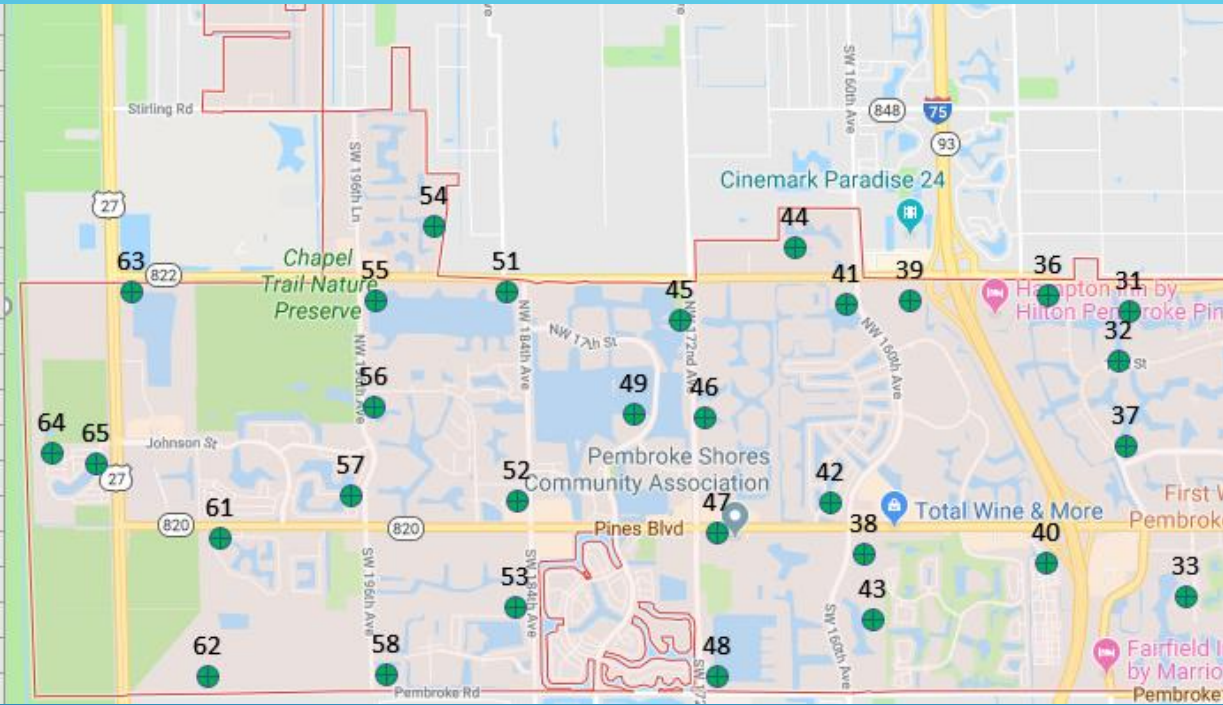
Phase II –

Conduct a disinfection byproduct study to determine TTHM formation at the entry point of the Gallup system and determine the percentage of TTHM compounds removed by storage tank mixing.

Phase III –

Develop a distribution monitoring plan that will monitor before during and after the transition and provide action steps when discolored water is encountered.

ADDITIONAL RECOMMENDATIONS



— Cl₂ < 0.5 mg/L
 — Cl₂ 0.5 – 1.0 mg/L
 — Cl₂ 1.0 – 2.0 mg/L
 — Cl₂ > 2.0 mg/L

ELECTRONIC MONITORING PROGRAM