

Executing a Capital Improvement Plan Using Outside Funding

24th Annual Surface Water Meeting
October 18, 2023

Jonathan R. Bonner, P.E., CFM
Insite Engineering, LLC
Tuscaloosa, AL



Or... New Uses for Duct Tape

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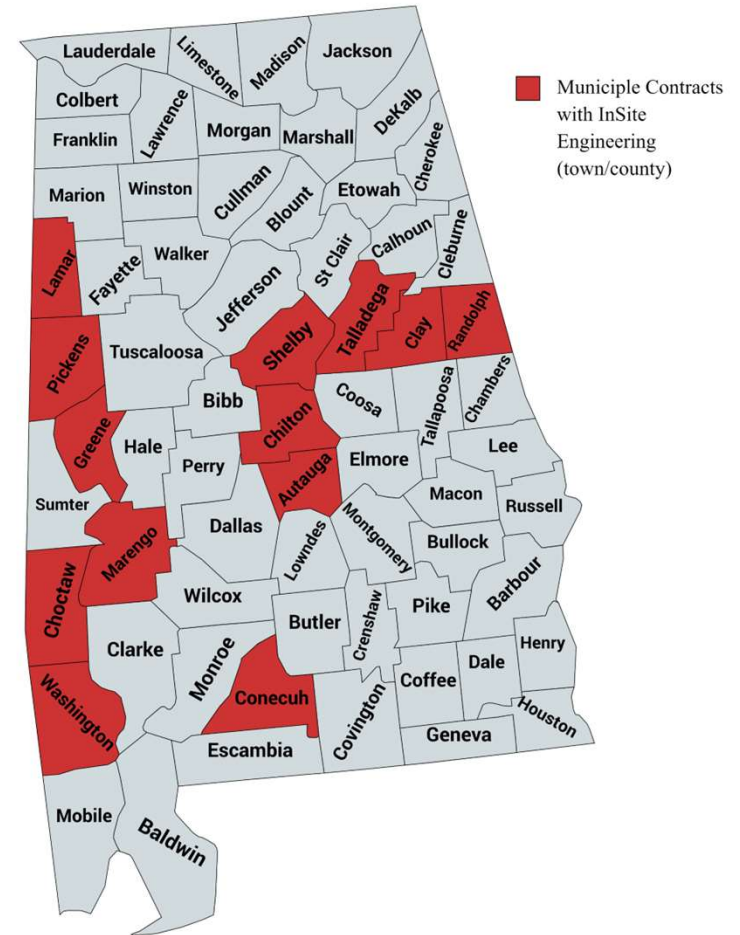


Insite Engineering

- Hoover and Tuscaloosa
- General civil and environmental engineering
- Focus on mid-sized cities and utility systems
- Residential, commercial, and industrial projects
- Water and wastewater
- Alabama, Georgia, Florida, Tennessee, Mississippi
- We design subdivisions, water treatment plants, roads, highways, ballparks, community centers, storm shelters, and other similar stuff. Things that improve the quality of life for everyone that is impacted.

SRF Practice

- Alabaster
- Aliceville
- Ashland
- Autauga County
- Calera
- Carrollton
- Lincoln
- Linden
- Millport
- Millry
- Pickens County
- Reform



DWSRF

- Alabaster Water Board
- Aliceville
- Utilities Board of the City of Bridgeport
- City of Calera Water Works
- Leeds Water Works Board
- Linden
- Utilities Board of the City of Oneonta
- Utilities Board of Rainbow City
- Utilities Board of Rainbow City
- Randolph County Water, Sewer & Fire
- Reform
- Millport
- Sycamore Water & Sewer Authority
- Sylacauga Utilities Board
- City of Talladega
- WMELWSA
 - Courtland
 - Distribution System

CWSRF

- City of Alabaster
- Waterworks and Sewer Board of the Town of Ashland
- Utilities Board of the City of Bridgeport
- Town of Carrolton
- City of Cordova
- Harvest-Monrovia Water & Sewer Authority
- Town of Holly Pond
- Linden
- Millport
- Millry
- Utilities Board of Rainbow City
- City of Rainbow City
- Reform
- Sycamore Water & Sewer Authority
- Sylacauga Utilities Board
- City of Talladega
- WMELWSA

Funding Programs

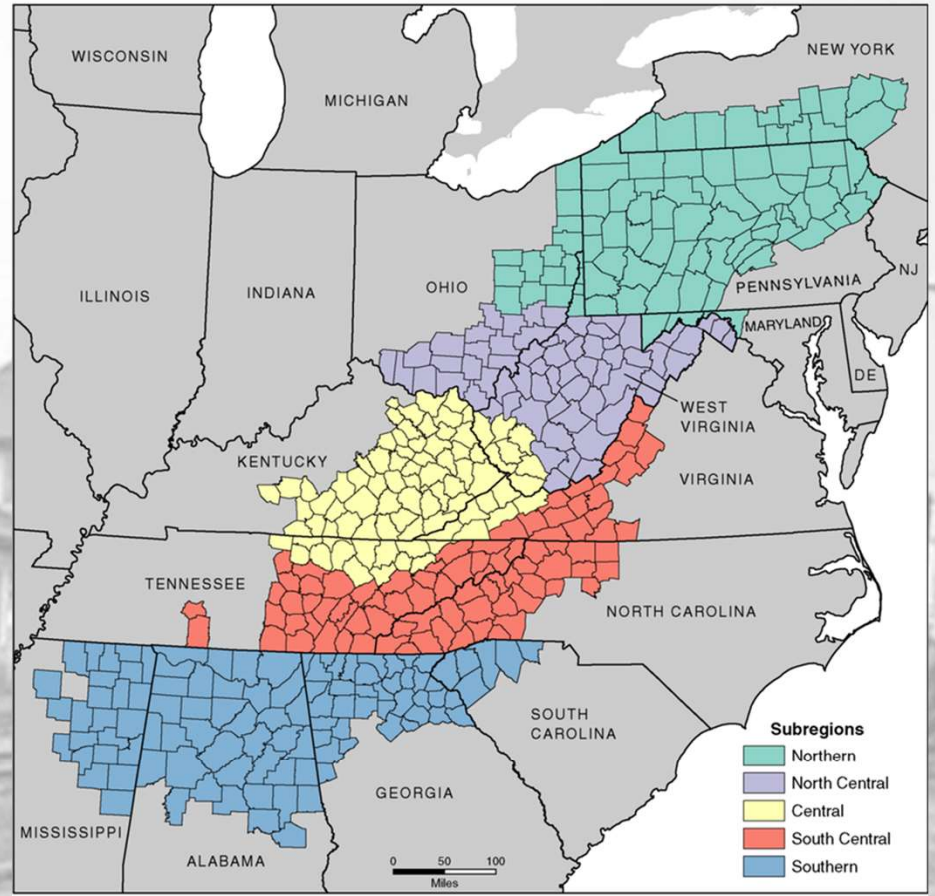
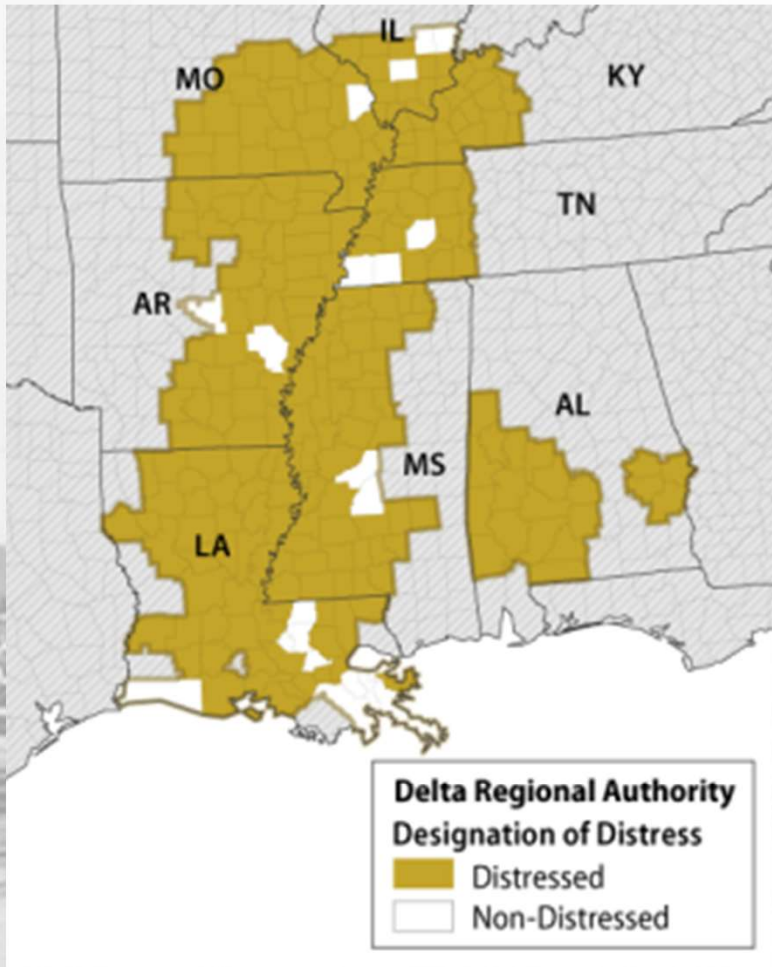
Program	Origin	Range of Funding
Community Infrastructure Fund (CIF)	Delta Regional Authority	\$300,000
Appalachian Regional Commission (ARC)	Alabama Department of Economic and Community Affairs	\$500,000
Community Development Block Grant (CDBG)	U.S. Department of Housing and Urban Development (HUD)	Competitive Funding
Research Conservation and Development (RC&D)	National Association of RC&D Councils	\$5,000 - \$25,000
State Revolving Funds (SRF)	Alabama Department of Environmental Management	> \$10,000

Delta Regional Authority

- \$300,000
- Requires a funding match
- In distressed counties, the funding does not need a match.

Appalachian Regional Commission

- \$500,000
- The funding requires a match.



Map by: Appalachian Regional Commission, November 2009.

Community Development Block Grant

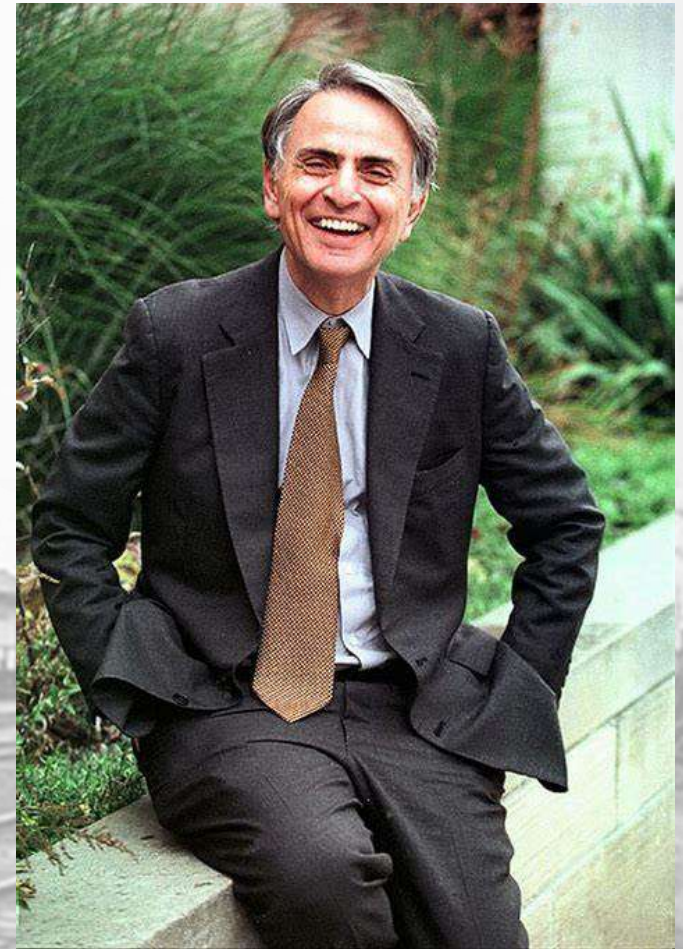
- Alabama received \$23,271,036 from HUD this year:
 - \$2.5 million went to counties
 - \$4.4 million went to large cities
 - \$5.7 million went to small cities
 - \$5 million went to economic development
 - \$4.4 million went to community enhancement
- It is a competitive funding program; the underlined sections are available for grants.

State Revolving Funds

- > \$10,000
- Includes the Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF).
- ADEM manages CWSRF and DWSRF, conducts project reviews, and disburses funds.

Need for Grants

- Municipalities are limited to the amount of debt that they can take on (AL Constitution).
 - No city, town...having a population of less than six thousand...shall become indebted...exceeding five per centum of the assessed value of the property therein, except for...water works...for which purposes an additional indebtedness not exceeding three per centum may be created
- High cost of maintenance, hard for a small-town budget.
 - Tank inspection and repair
 - Lead and Copper rule compliance
 - PFAS compliance...billions and billions of dollars
 - Routine maintenance (water leaks, chemicals, etc.)



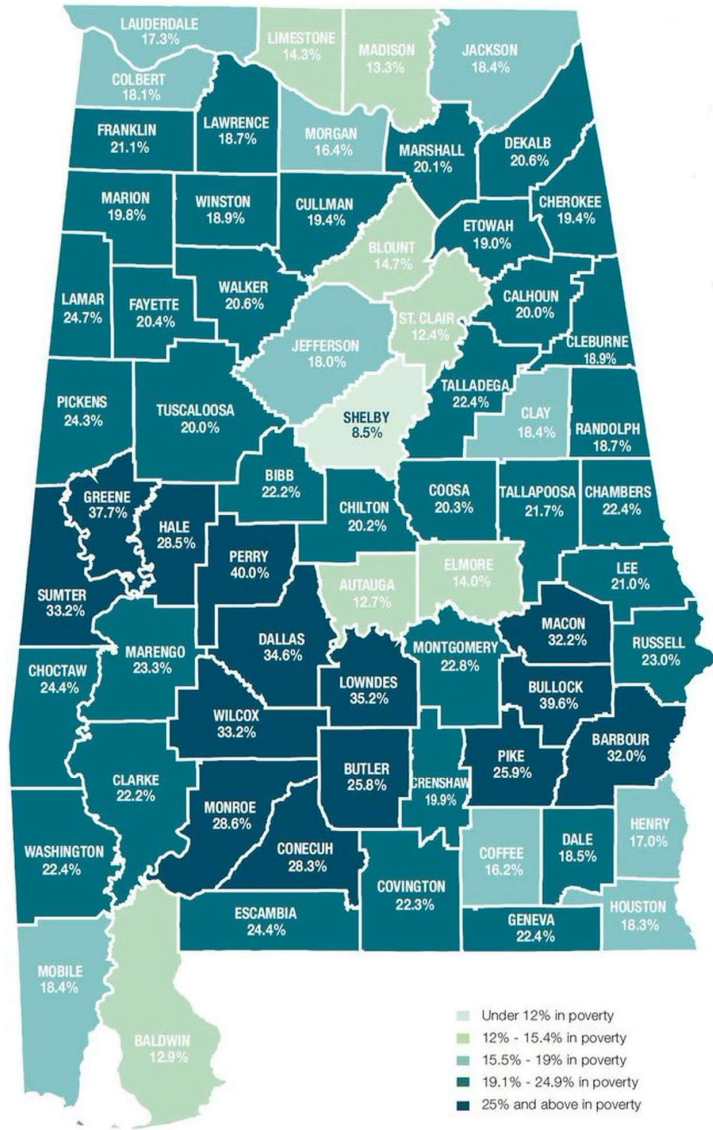
Potential Cost Increase Without Grant Programs

- Project Cost:
 - \$5,454,100.00
- Project Life:
 - 20 Years
- Cost of Money (Bond Rate):
 - 4.5%
- Connections:
 - 780
- Annual premium over operating cost:
 - \$419,290.00
- Monthly base rate increase per customer:
 - \$44.80

Potential Cost Increase Without Grant Programs

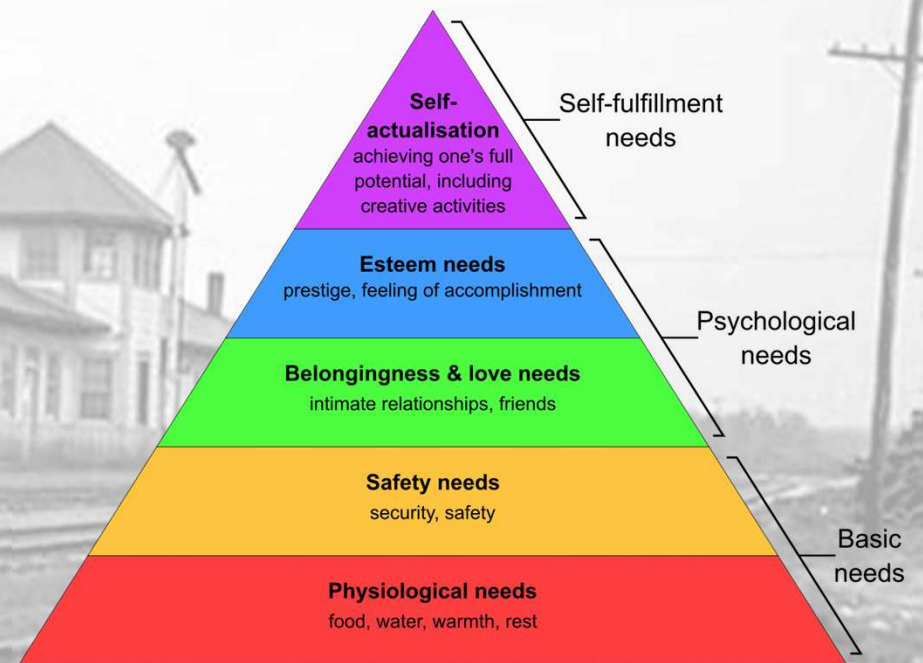
- Project Cost:
 - \$1,713,000
- Project Life:
 - 20 Years
- Cost of Money (Bond Rate):
 - 4.5%
- Connections:
 - 462
- Annual premium over operating cost:
 - \$131,688.00
- Monthly base rate increase per customer:
 - \$23.75

Might not seem much...



Also Increases Burden on Some

- Some studies show 2/5ths of residents have unaffordable water bills
- Myth of displaced priorities
- Bills over 4% of household income are considered unaffordable
- Grant programs become increasingly important for small utility systems



DWSRF Case Studies

Reform, AL

Historically Underfunded O&M Practices

Population: 1,520

Water Connections: 780

Annual Revenue: \$ 2,881,026
(2022)

Annual Budget: \$ 2,613,028 (2022)

Water & Sewer Revenue: \$ 622,635
(2022)

Water & Sewer Operating Expenses:
\$ 635,436 (2022)

SRF Money Awarded:
\$5,454,099.23

Millport, AL

Components with End-of-Life Issues

Population: 1,010

Water Connections: 462

Annual Revenue: \$ 1,289,776
(2022)

Annual Budget: \$993,386 (2022)

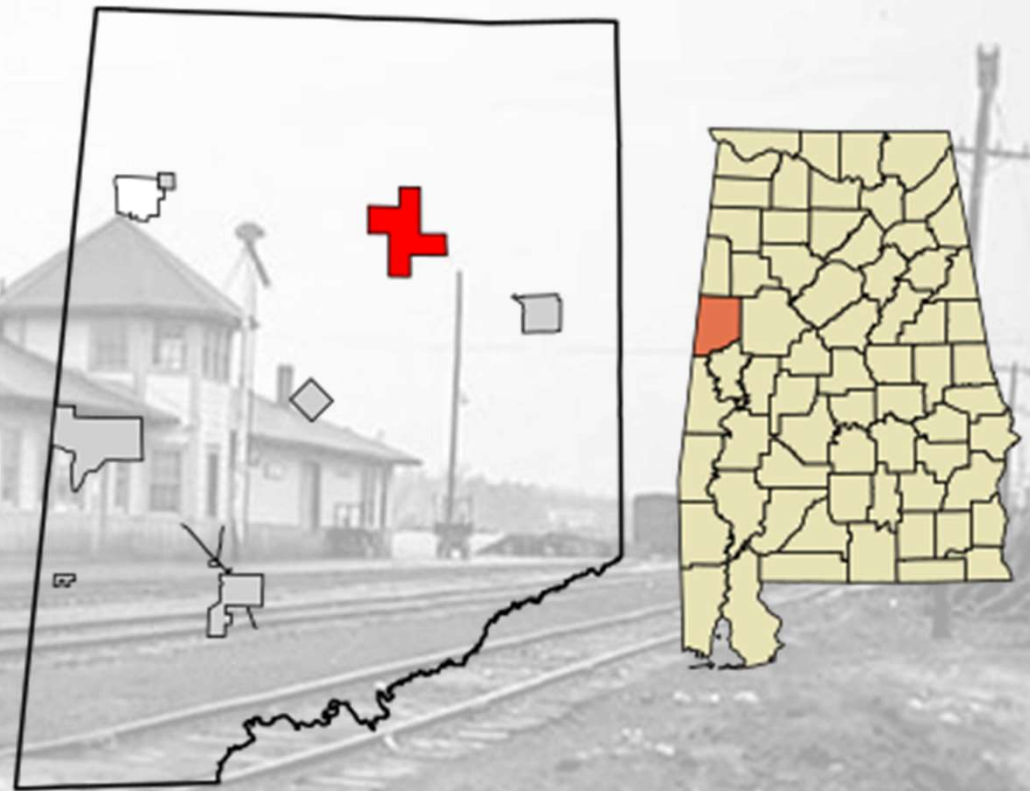
Water & Sewer Revenue: \$511,617
(2022)

Water & Sewer Operating Expenses:
\$ 541,498 (2022)

SRF Money Awarded: \$1,713,000

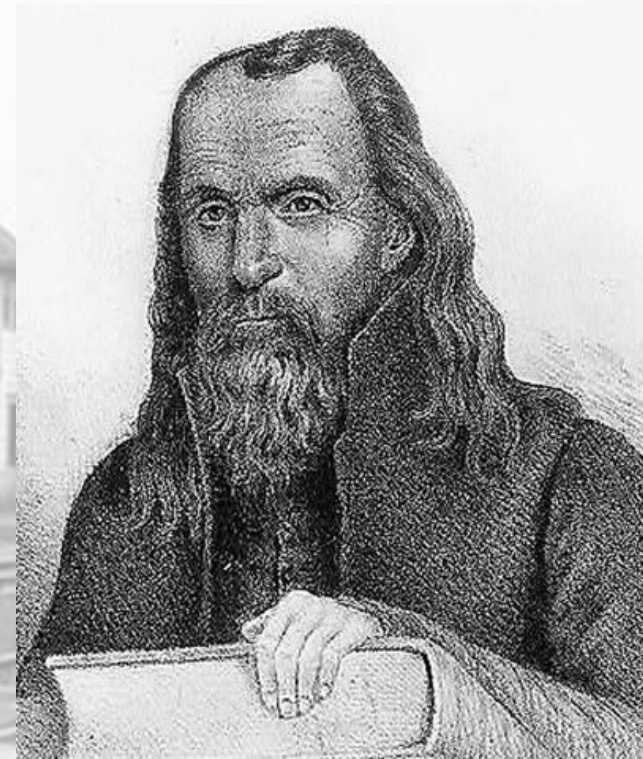
City of Reform

- Pickens County
- Located on Lubbud Creek
- Northern Terminus of the AT&N Railroad
- Incorporated in 1898



City of Reform

- Famously named by Lorenzo “Crazy” Dow, an eccentric Methodist missionary
- Attempted to hold a revival that didn’t go well
- Dow was asked to suggest a name for the town
- “**Repent** or **Reform**” take your pick!



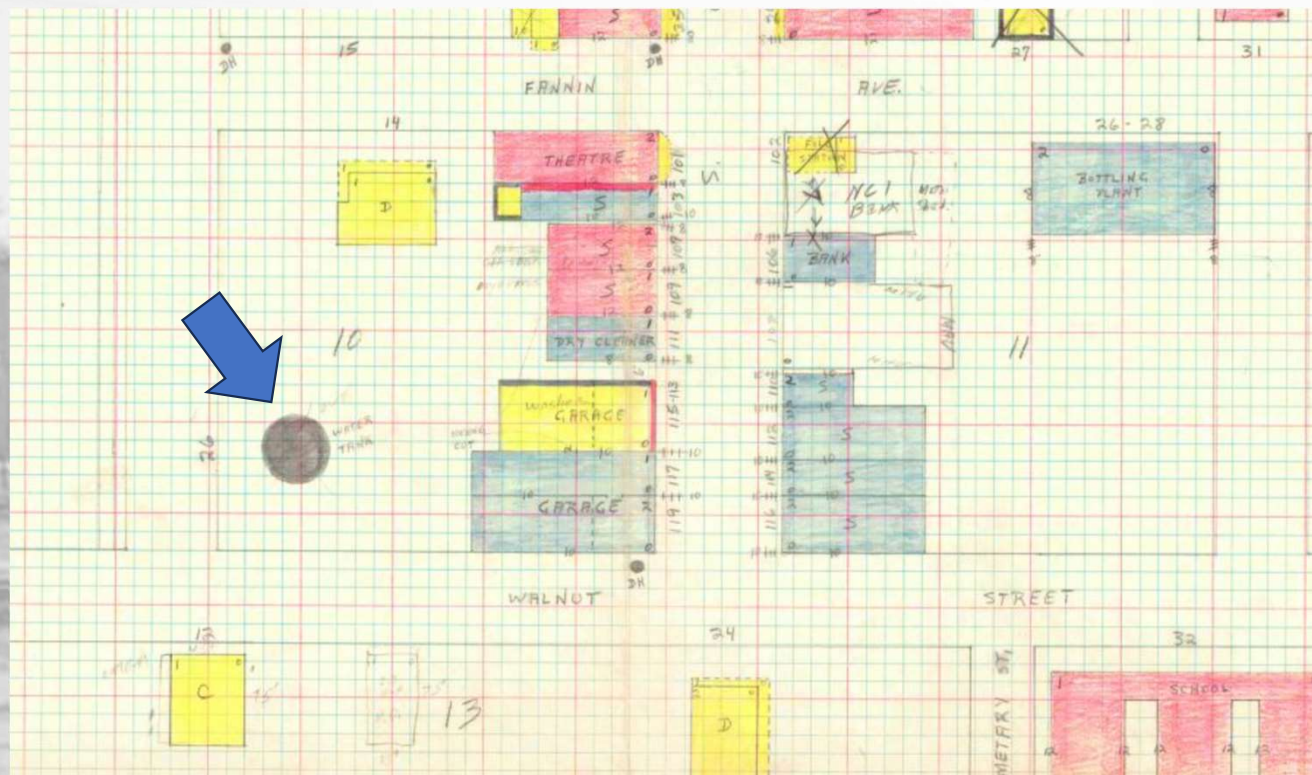
City of Reform



- Former home of a Westinghouse bulb factory
- Home of Pickens County High School (Tornadoes)



City of Reform

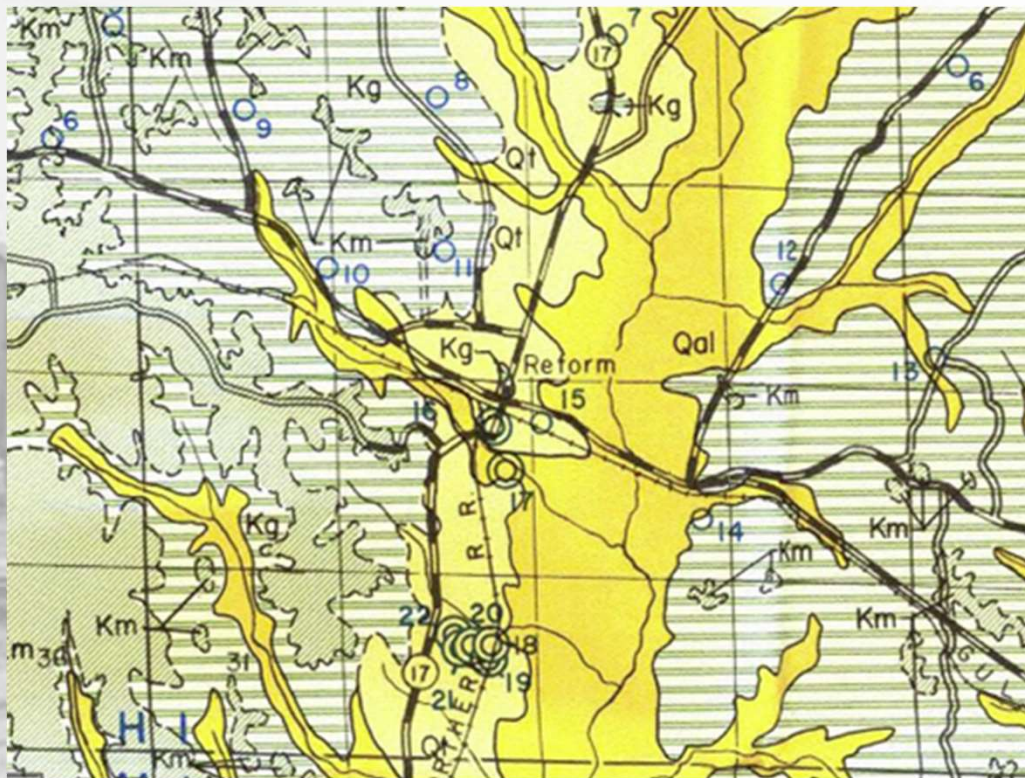


- Water system dates to 1926
- Much of the older system is still in place in the downtown area
- Had one well and one elevated tank
- Both gone now





Source Water



- Wells from the Gordo Aquifer:
 - Well No.1, depth of 77 feet, drilled in 1960, 63 gpm
 - Well No.2, depth of 96 feet, drilled in 1983, currently undergoing emergency rehabilitation
- Permitted for 200 gpm (Reform No. 1) and 450 gpm (Reform No. 2)
- Good luck getting that now!

Storage



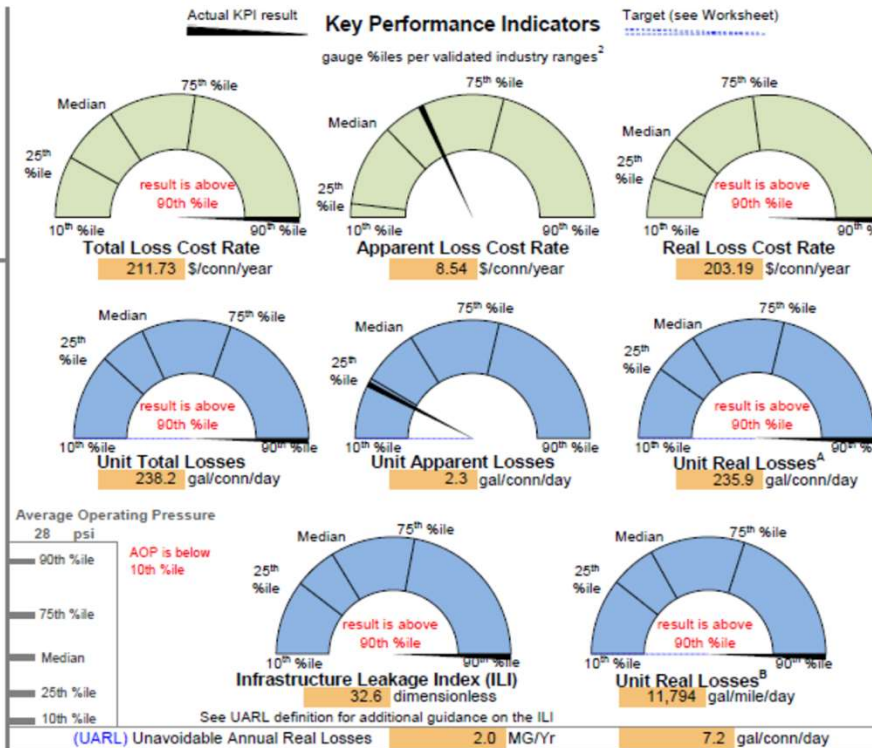
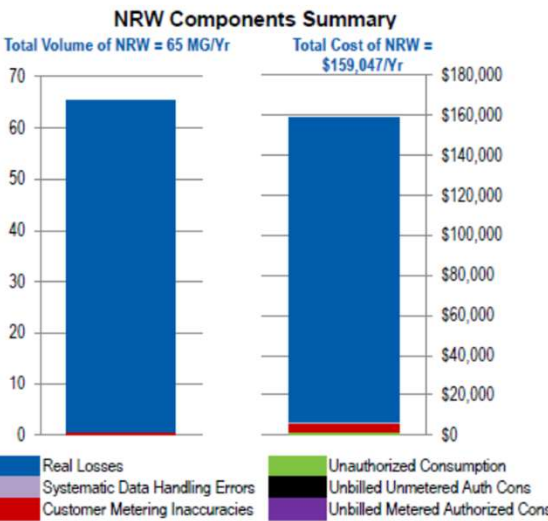
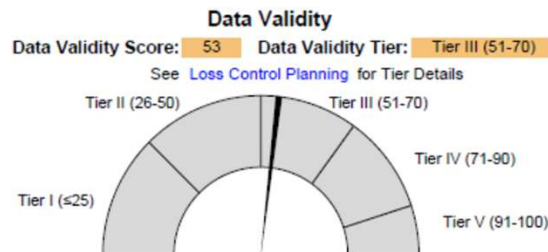
- A 500,000-gal Storage Tank from 1988
- A 500,000-gal Storage Tank Taken Offline in 2021

Distribution

- 60 miles of water mains
- 50 miles of Cast/Ductile Iron
- 10 miles of PVC
- (Best estimates)
- Do have radio-read meters!



High Water Losses



See UARL definition for additional guidance on the ILI

Guidance Information for Key Performance Indicators

KPI data by cohorts may be found in WRF 4095 Guidance Manual, Appendix B (2019)³.

- Actual KPI results that fall below 10th %ile or above 90th %ile do not necessarily imply error, but should be viewed with scrutiny.
- Percentiles not intended to imply targets. Targets may be input by user for operational KPIs, if desired, on Worksheet.
- See UARL and ILI in Definitions tab for discussion of size and pressure limitations.
- Systems that fall on the extreme ends of size or connection density should use caution when interpreting Unit Losses KPIs.

² KPI %iles shown above are not segregated by cohorts. Limited

- 11,794 gal/mile/day
- Well over 50% NRW
- Estimated cost of NRW \$159,047/year
- 90th %tile of water losses in US

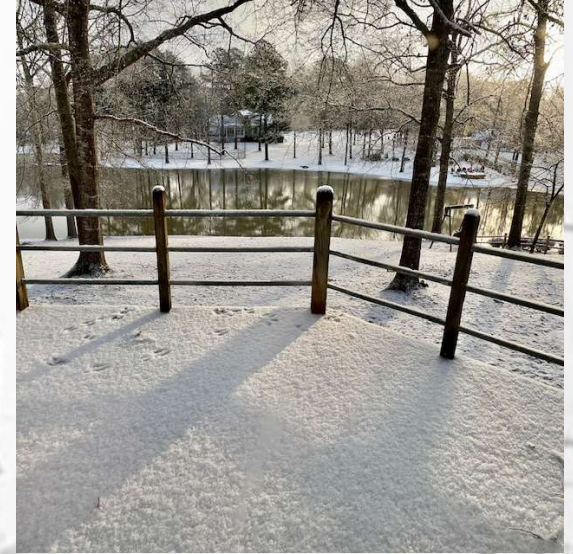
Need for Proposed Facility

- Extremely deteriorated condition of the existing water system
- Lack of fire suppression supply: August 2020
 - A local industrial fire triggered their fire suppression system
 - Drained the 500,000-gallon storage tank (in a heart-beat)
 - Wells could not meet the demand
 - Caused \$170,000 worth of damages



Need for Proposed Facility

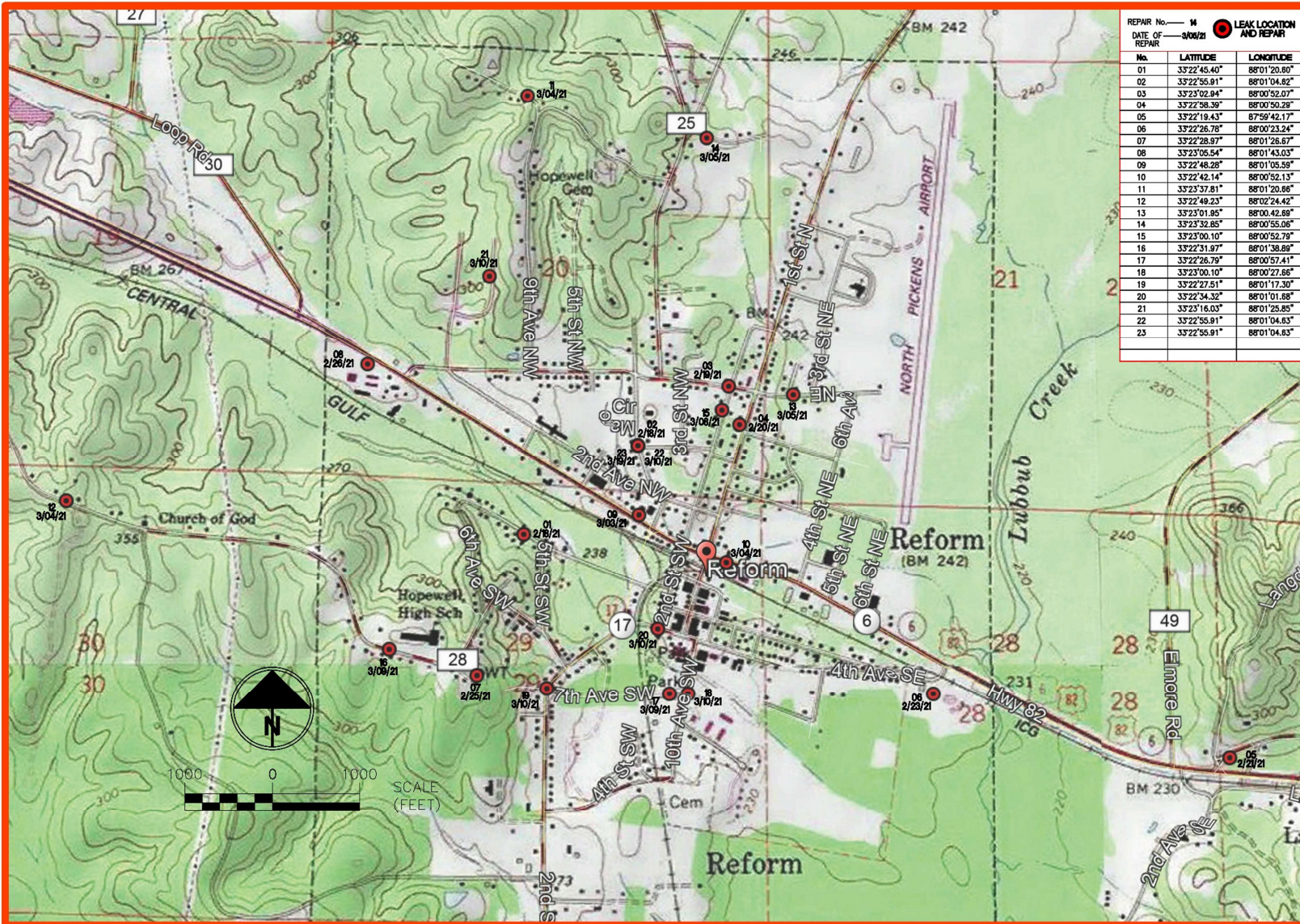
- January 2021
 - A motorist struck and broke a fire hydrant.
 - The resulting leak drained the entire water system
 - 750 households and businesses were without water.
- February 2021
 - A major winter storm came through Reform.
 - In two days, the city lost 300,000 gallons of potable water.
 - Pressure losses below the ADEM requirement, 20 psi.
 - Residents left without water



Need for Proposed Facility

- Underwent extensive repairs for leaks to restore water





REPAIR No. — 14
DATE OF REPAIR — 3/05/21

LEAK LOCATION AND REPAIR

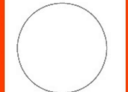
No.	LATITUDE	LONGITUDE
01	33°22'45.40"	88°01'20.60"
02	33°22'55.91"	88°01'04.82"
03	33°23'02.94"	88°00'52.07"
04	33°22'58.39"	88°00'50.29"
05	33°22'19.43"	87°59'42.17"
06	33°22'26.76"	88°00'23.24"
07	33°22'28.97"	88°01'28.67"
08	33°23'05.54"	88°01'43.03"
09	33°22'48.28"	88°01'05.59"
10	33°22'42.14"	88°00'52.13"
11	33°23'37.81"	88°01'20.66"
12	33°22'49.23"	88°02'24.42"
13	33°23'01.95"	88°00'42.68"
14	33°23'32.85"	88°00'55.06"
15	33°23'00.10"	88°00'52.79"
16	33°22'31.97"	88°01'38.89"
17	33°22'26.79"	88°00'57.41"
18	33°23'00.10"	88°00'57.86"
19	33°22'27.51"	88°01'13.30"
20	33°22'34.32"	88°01'01.68"
21	33°23'16.03"	88°01'25.85"
22	33°22'55.91"	88°01'04.83"
23	33°22'55.91"	88°01'04.83"



**EMERGENCY LEAK REPAIR LOCATION MAP
 FOR THE
 CITY OF REFORM
 PICKENS COUNTY, ALABAMA**

**REPAIR
 LOCATION
 DRAWING**

PROJECT INFO:
 INSITE 2103 No. 21033.00
 PLOTTED: XXXXXX



THIS SHEET CONTAINS:
 SHEET TITLE
 LEAK LOCATION MAP

SCALE: AS SHOWN
 SHEET 1 OF 1
ELR.1

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Consent Order: May 2022

- The City of Reform was issued an ADEM consent order. The following violations are outlined below:
 - The City has failed to maintain its water facilities in a safe, clean, and operable condition.
 - The City has failed to have its water storage tanks inspected at regular intervals and has failed to correct any deficiencies identified during inspections in a timely manner.
 - The City has documented high water loss with annual averages between 47-55.5%.
- The purpose of the ADEM consent order is to resolve and dispose of all allegations and contentions concerning the violation of Alabama Safe Drinking Water Act.



Project	Action Item	Required Date
Storage Tank	Complete permit to construct application submittal to the Dept.	9/1/2023
Test Well	Submittal of well drilling log	1/1/2024
New Well	Complete permit to construct application submittal to the Dept.	7/1/2024
Distribution Upgrades	Complete permit to construct application submittal to the Dept.	7/1/2024
Storage Tank	Request to place in service	9/1/2024
Treatment	Complete permit to construct application submittal to the Dept.	2/1/2025
Distribution Upgrades	Request to place in service	9/1/2025
New Well and Treatment	Request to place in service	4/1/2026

Why?

- No living contextual knowledge of water system
 - No good maps
 - No good records
- Past practices of
 - Maintenance (or lack thereof)
 - System upgrades (or lack thereof)
 - **Monobuttockular** approach to system operation
 - Lack of funding
 - Lack of funding
 - Lack of funding



Why?

1. Reform currently does not have sufficient storage capacity to meet the current population demand, or storage for emergencies.
2. The current supply wells can provide no more than 220 gpm of water. Reform No. 1 is in the final stages of its useful life and must be replaced. **UPDATE – NOW DOING 75 GPM**
3. Reform No. 2 well is significantly degraded from its original production rate. Reform should plan on replacing it also within the next 10 years.
4. **Due to pervasive leaks within the distribution system, Reform's water system operates daily on the verge of collapse.** Constraints in construction, layout, and design make it impossible to service even small leaks without shutting off significant swaths of customers.
5. Reform lacks a comprehensive and proactive monitoring system to plan for water line upgrades.



Solution

- Addressing acute needs:
 - Develop a new supply well on the north side of town including observation well at a suitable location
 - Install a new 500,000 gal water storage tank on the north side of town
 - Install strategic isolation valves within the system (“Smart System”)
 - Increase interconnectivity with County Water system
- Addressing chronic needs
 - **Hire another operator**
 - Develop a comprehensive system map
 - Develop a comprehensive maintenance and repair plan
 - Perform periodic routine leak detection

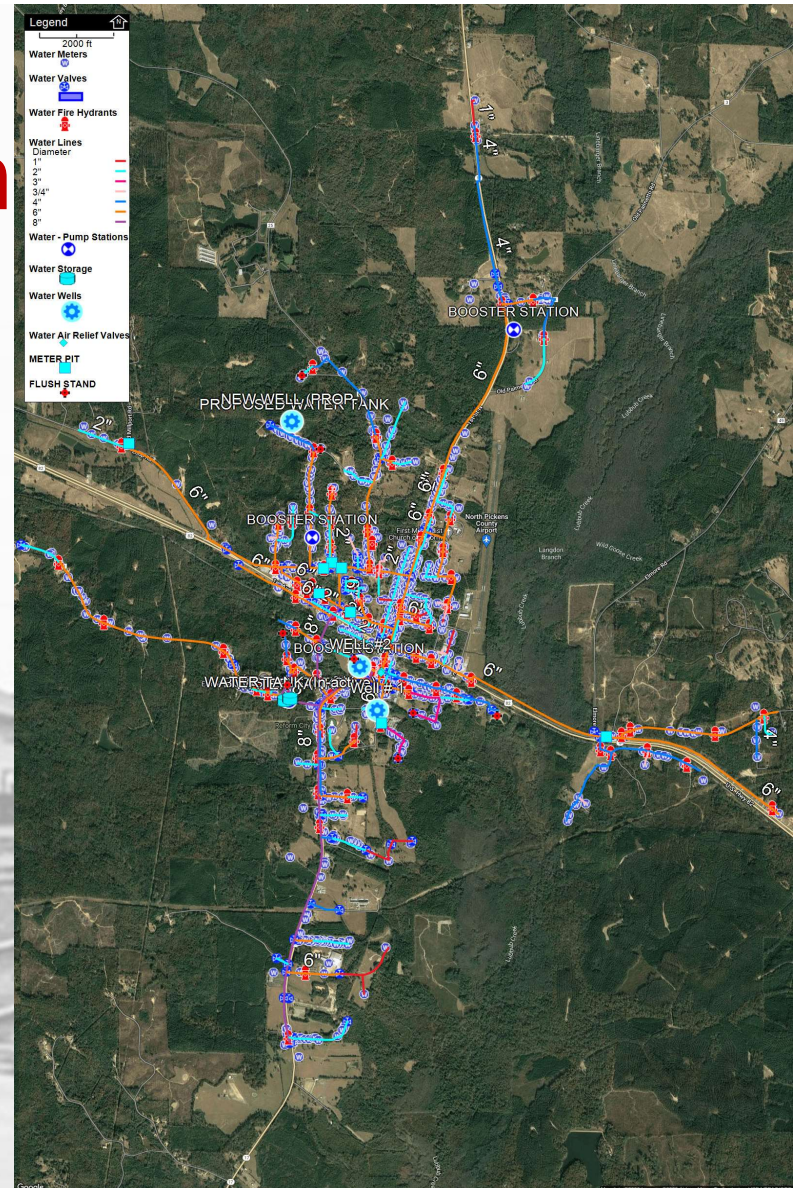
Solution

- Challenges
 - Will require iron removal plant as iron is expected to be ~15 ppm in lower aquifers
 - Finding another operator
 - Developing OPEX Capital for future projects and routine maintenance
 - Not enough money to replace all 50 miles of distribution lines



Engineering Approach

- Broad assessment conducted in response to Consent Order
- Water use assessment
 - Need additional 400 gpm
- Identified potential well locations
- Identified storage needs
- Detailed distribution system survey and started GIS
- Water system modeling



Engineering Approach

- Applied for every grant available in US
 - CDBG
 - ARC
 - DRA
 - USDA (for emergency repairs)
 - USDA SEARCH
 - SRF
- Used all City's ARPA funds
- Received only
 - Round 1 ARPA funds (~\$300,000)
 - USDA Emergency Repairs (~\$100,000)
 - DRA Grant (\$250,000)
 - SRF 100% Grant
 - Took a long time – September 2022 to August 2023

Engineering Approach

- Budget

- Total Award -- \$5,500,000
- Construction -- \$4,961,600
- Supplement (DRA) -- \$250,000
- ARPA -- \$300,000
- Total -- \$6,050,000

- Budget Estimates

- Supply -- \$2,071,300
- Storage -- \$1,191,100
- Distribution -- \$2,787,600

- NOTE TO NON-ENGINEERS

- ESTIMATES BEFORE DESIGN ARE EDUCATED GUESSES!
- *YOU NEVER WANT YOUR ENGINEER TO BE THE LOW BIDDER!!!!*

Where Are We Now?

- Still losing water at a rate of about 50%
- Major leaks repaired but others happen
 - Just last month
- Producing:
 - 200 gpm from Reform No. 2
 - 75 gpm from Reform No. 1
- Progress
 - Site has been developed for new water supply, treatment, and storage complex
 - Bids have been taken for drilling new well
 - Emergency rehab has been completed on Reform No. 2
 - Once water testing done will move to treatment and storage design
 - System upgrades engineering ongoing

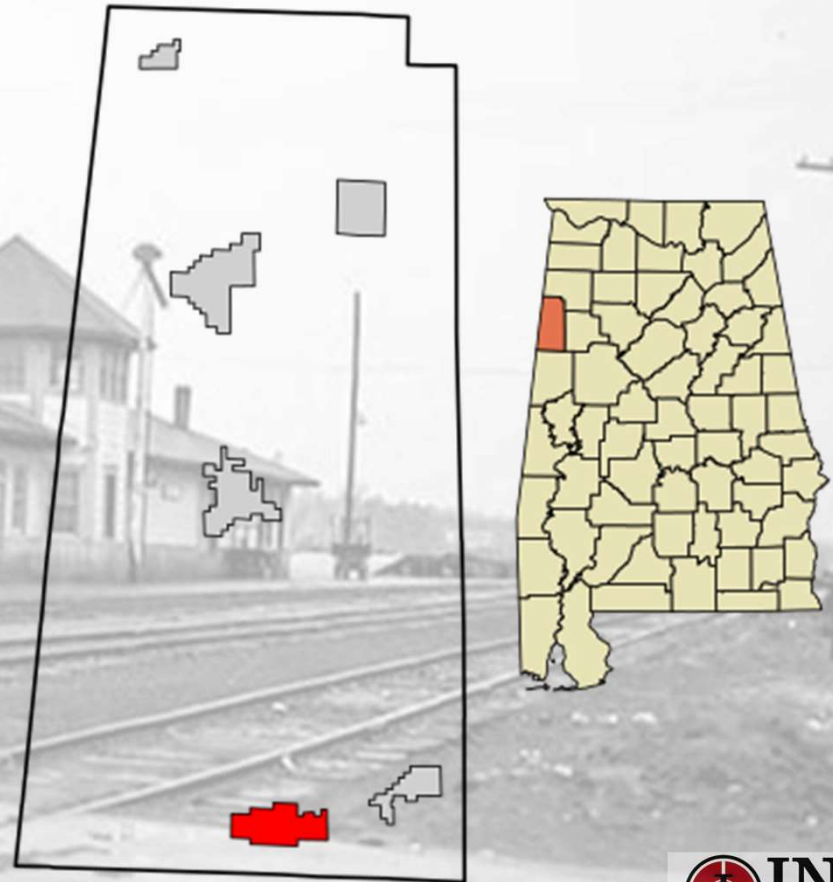
What Did It Really Take?

- **Leadership**
- New Mayor, Melody Davis, took office in November before first catastrophe
- Fortitude of City Council backed her decisions to not “kick the can down the road”



Town of Millport

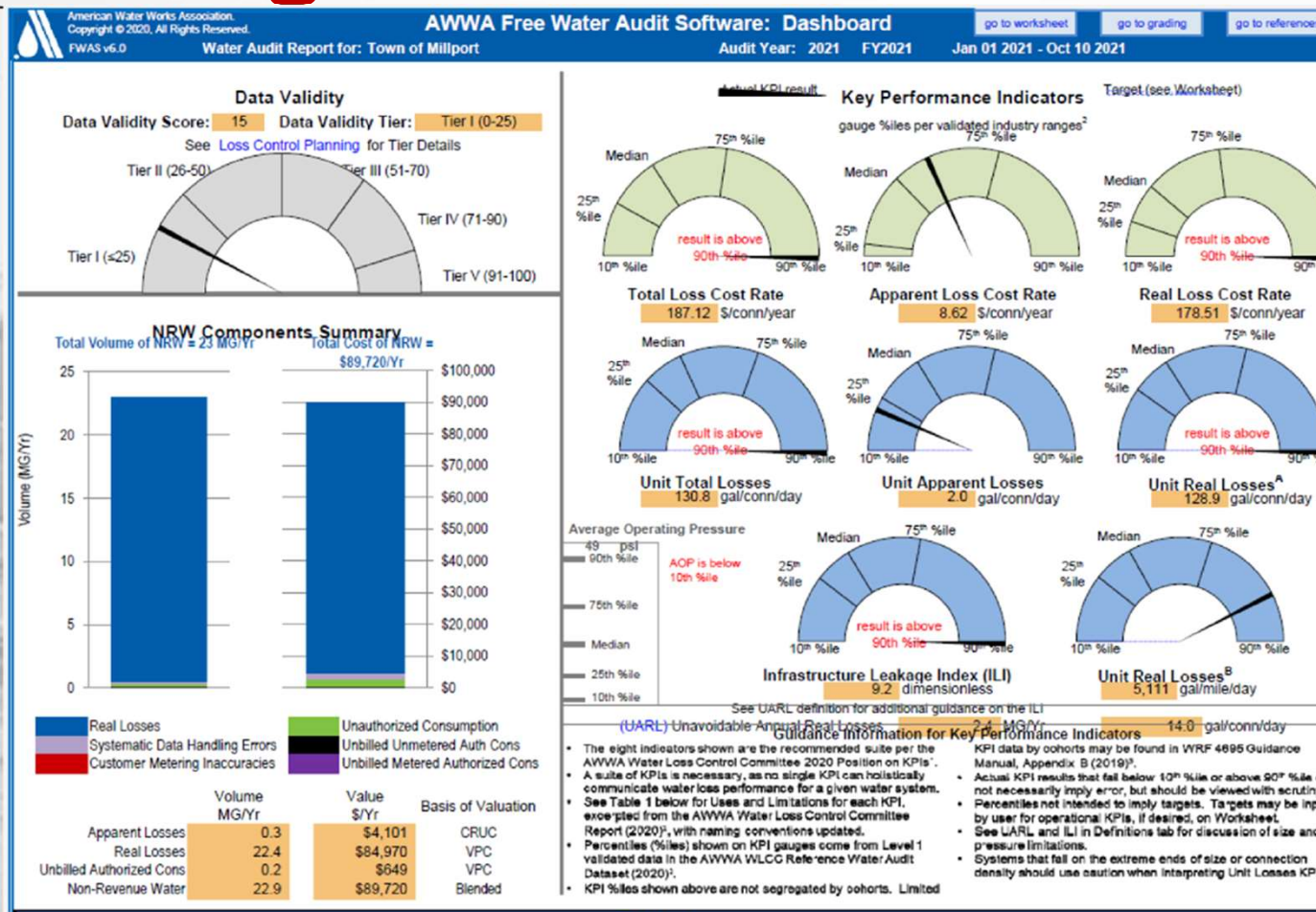
- Located in Southern Lamar County
- Well maintained system
- Three water tanks
- One primary DW well
- One secondary industrial supply well
- Iron removal plant
- On Luxapallila Creek
- Two major industries



Town of Millport



High Water Losses



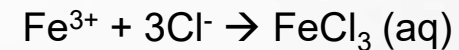
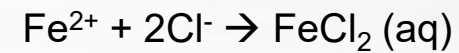
- NRW due to:
 - Maintenance on current filter
 - 60,000 gal/day
 - Iron removal plant leaks
 - Been repaired many times
 - Fabricated from aluminum
 - Not compatible with chemistry
- Operate "Split" system



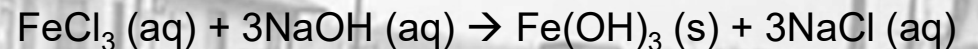
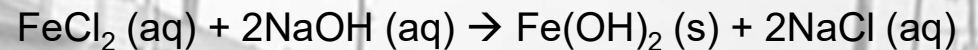
Millport DWSRF

- Funding For:
 - WesTech RapiSand Plus™
 - Existing Filter Unit Repair
 - Booster Pump Feed Tank Construction
- Need for Proposed Facilities
 - Increased Water Demand
 - Need for Increased Capacity
 - Need for Increased Capability

The plant now operates with a chlorinator feeding into the influent raw water produced from the Town's well. This reduces the iron, forming aqueous iron II and iron III chloride as shown in the two half reactions:

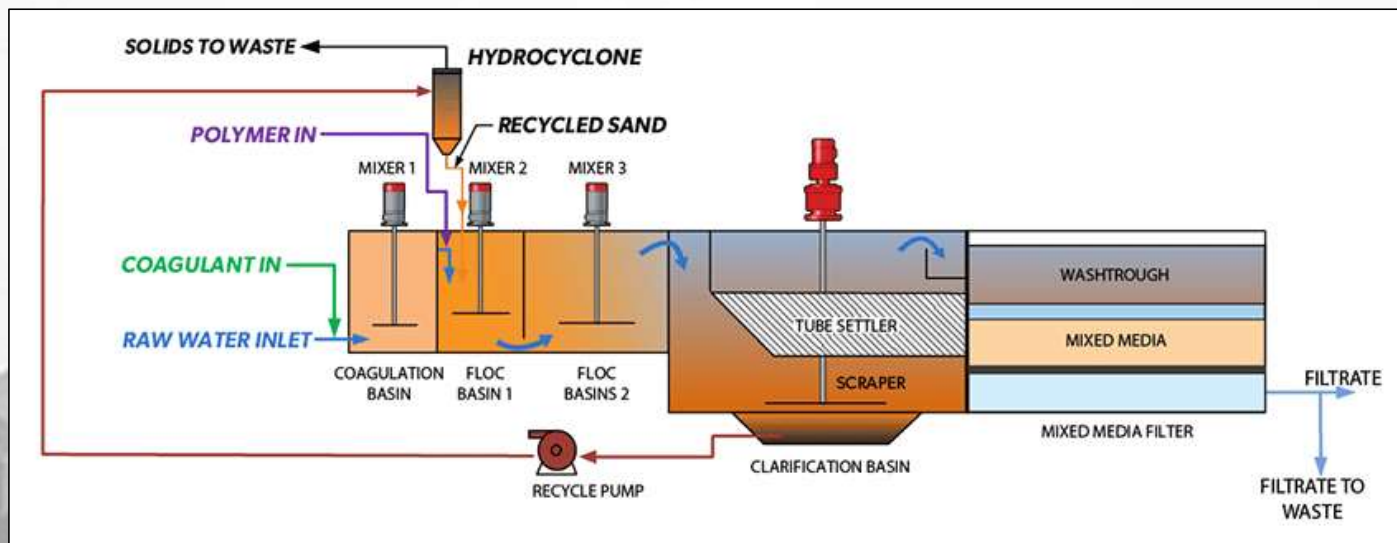


These iron derivatives are also commonly used coagulants, and react with caustic soda (sodium hydroxide), to form a very heavy hydroxide floc:



Iron Buildup on the surface of Millport's water treatment unit

Proposed Water Treatment Plant



- Replace Standpipe tank
- Install package treatment plant
- Replace corroded aluminum plating

Budget

- Only applied to SRF
- Have existing debt from past USDS projects
- Cannot match funds
- SRF Package
 - Total -- \$1,713,000
 - Construction -- \$1,487,077
- Estimate
 - Production -- \$1,066,000
 - Storage -- \$394,232
 - Distribution -- \$27,000
- Not nearly in same place as Reform due to better system maintenance
- Upgrades simply due to age

What Did It Really Take?

- **Leadership**
- Seasoned Mayor Stanley Allred
- Predecessors did a good job of building resiliency in system
- Strong backing from City Council



Questions?

