



Underground Construction Technology

International Conference & Exhibition

PIPELINE CONDITION ASSESSMENT & CLEANING “DEVIL IS IN THE DETAILS” CITY OF DE SOTO, KANSAS RAW WATER MAIN

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Water Services
Ace Pipe Cleaning, Inc.**



ACE PIPE CLEANING, INC.
A CARYLON COMPANY



CASE STUDY OVERVIEW

- HISTORY AND BACKGROUND-DE SOTO, KANSAS
- PHASE 1 – INITIAL SCOPE: CONDITION ASSESSMENT
- PHASE 2 – REVISED SCOPE: CLEANING
- PHASE 3 – REVISED SCOPE: REVISED CLEANING
- PHASE 4 – CONDITION ASSESSMENT CONCLUSIONS
- PHASE 5 – NEXT PHASE



HISTORY AND BACKGROUND CITY OF DE SOTO, KANSAS

- 30 MILES SOUTHWEST OF KANSAS CITY
- POPULATION 6000
- 1600 WATER SERVICE CONNECTIONS
- 800K GPD WTP
- ALONG THE KANSAS RIVER





HISTORY AND BACKGROUND CITY OF DE SOTO, KANSAS

- SUNFLOWER ARMY AMMUNITION PLANT
 - 1940S
 - LOCATED SOUTH OF DE SOTO
- REACTIVATED IN 1960S
 - VIETNAM WAR EFFORT
 - 12 WELLS INSTALLED IN 1967
 - 6 SOUTH OF KANSAS RIVER
 - 6 NORTH OF KANSAS RIVER





HISTORY AND BACKGROUND CITY OF DE SOTO, KANSAS

- SUNFLOWER ARMY AMMUNITION PLANT
 - DEACTIVATED 1993
- CITY OF DE SOTO TOOK OVER WATER SYSTEM
- CURRENTLY OPERATING:
 - 3 WELLS NORTH OF KANSAS RIVER
 - 2 WELLS SOUTH OF RIVER
 - WTP NEAR FORMER AMMUNITION PLANT





HISTORY & BACKGROUND CITY OF DE SOTO, KANSAS

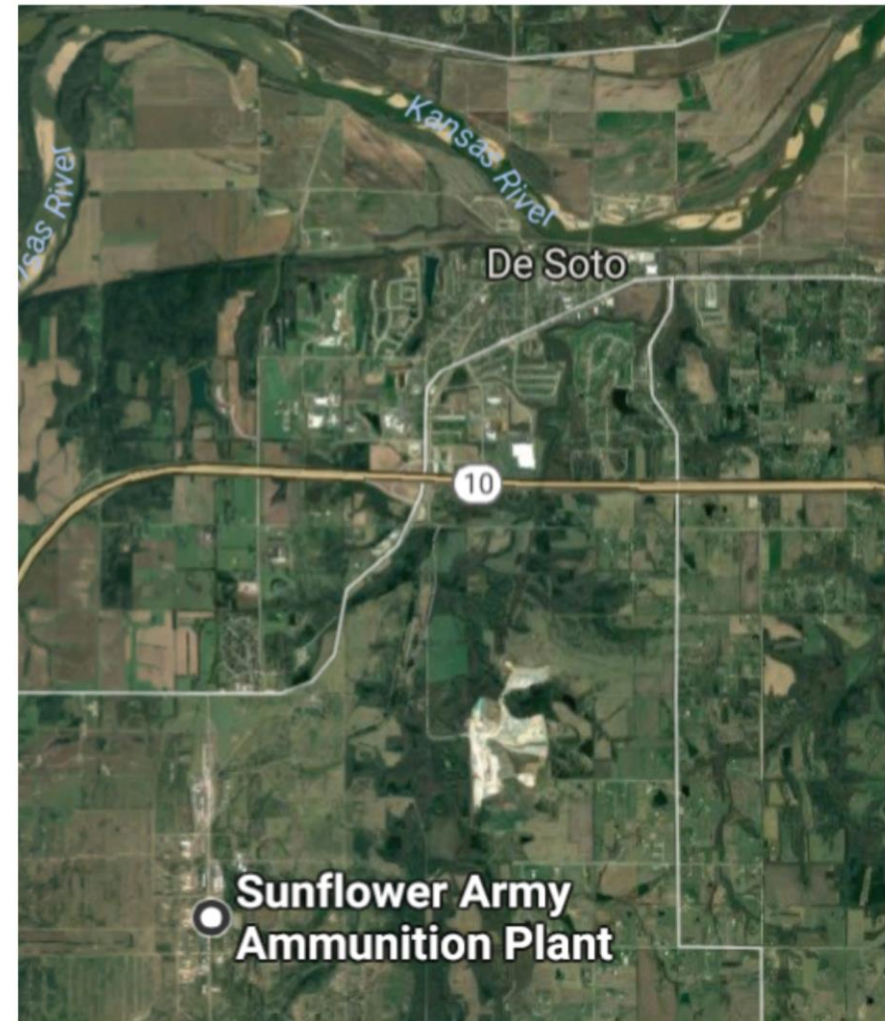




HISTORY & BACKGROUND CITY OF DE SOTO, KANSAS

- CASE STUDY

- 3 WELLS NORTH OF KANSAS RIVER
- 3000 LINEAR FEET
- 16-INCH DIAMETER
- DUCTILE IRON PIPE





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HISTORY & BACKGROUND CITY OF DE SOTO, KANSAS





PROJECT LOCATION

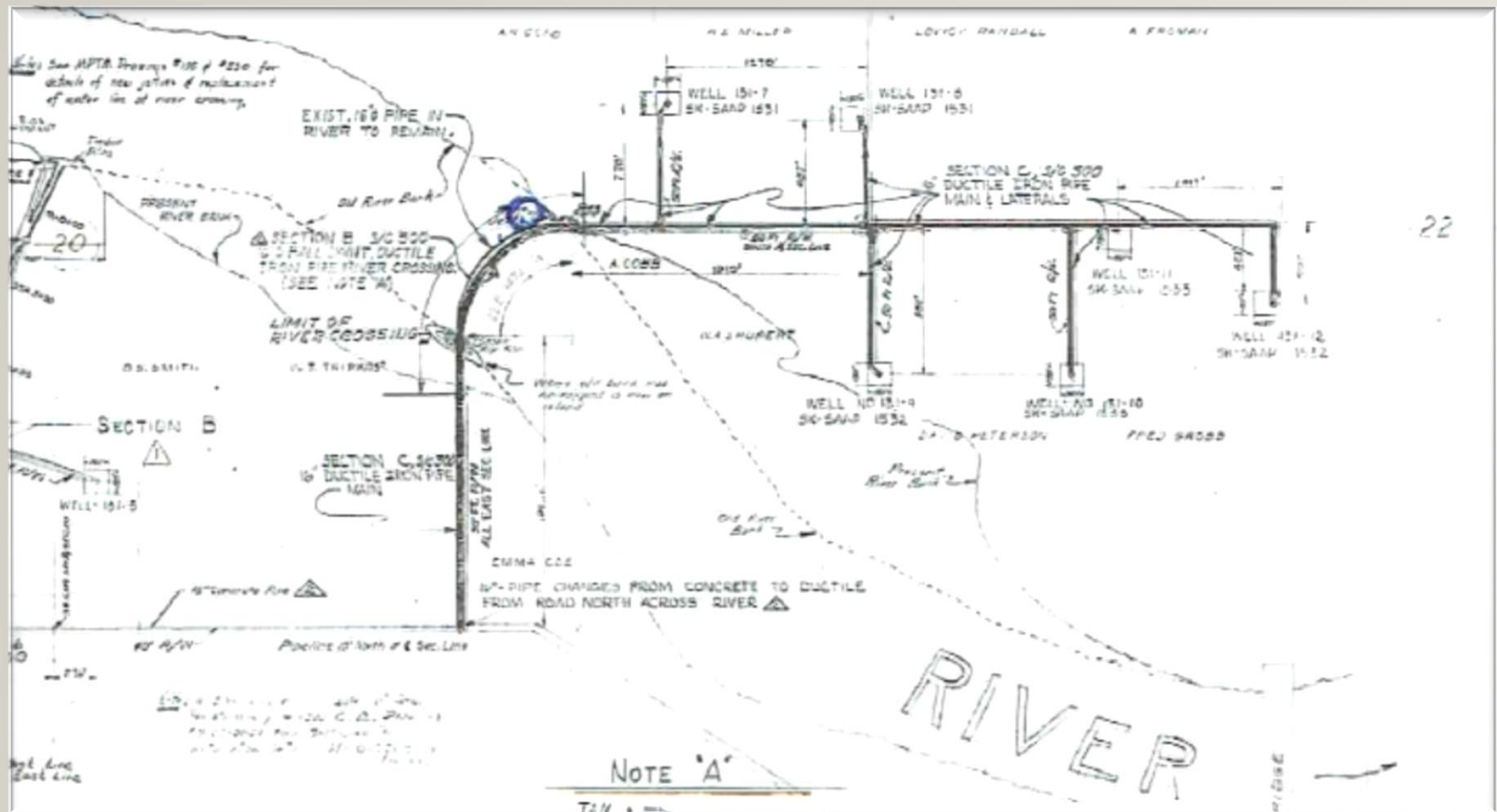
2016 Project:

- Strategy meeting with City
- Perform initial survey
- Initial internal inspection
- Hydraulic cleaning
- Additional cleaning
- Final internal inspection
- Engineering report
 - Conclusions
 - Recommendations
 - Budget





WELL INSTALLATION CONSTRUCTION PLANS





INITIAL SCOPE: CONDITION ASSESSMENT

- NORTH WELL FIELD - PRESSUE DROP UNDER THE RIVER
 - NORTH OF RIVER – 250 PSI
 - SOUTH OF RIVER – 150 PSI
- LITTLE CONSTRUCTION INFORMATION FOR TRANSMISSION MAIN UNDER RIVER
- WHAT WAS THE CONDITION OF THE TRANSMISSION MAIN, ESPECIALLY UNDER RIVER?



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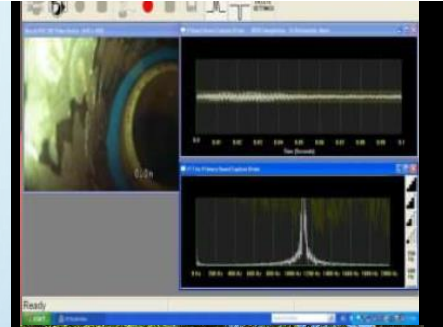
PREPARATION AND INSPECTION



Install Hot Taps



Attach Technology



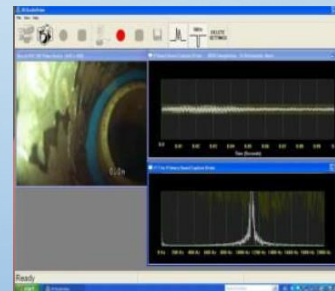
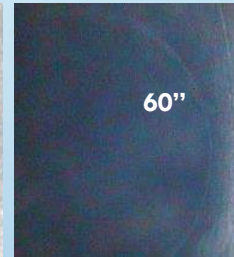
Launch System



DIRECT MAIN INSERTION INSPECTION TOOL

LDS1000

- 12" and greater pipe diameter (all pipe materials up to 42")
- Access: ARV, hot tap, gate valve, pigging wye, 2" Access
- HD quality CCTV and footage
- Acoustic leak detection
- Sonde for X-Y-Z
- 3,300' in a single deployment (neutral buoyant cable)
- Electronic drive and drum system
- Use of drogue (parachute) to navigate under active flow conditions
- Up to 250 psi
- Real-time observations in the field





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3" mains



INITIAL RESULTS



Initial Results



INITIAL CONDITION ASSESSMENT CONCLUSION

- **COULD NOT EVEN BEGIN THE INSPECTION**
- **PIPE HAD SILTED UP OVER 40+ YEARS**





REVISED SCOPE: CLEANING

- TRANSMISSION MAIN CLEANING PLAN
- TAKE WELL FIELD OUT OF SERVICE – COORDINATE WITH THE CITY
- DRAIN THE SYSTEM
- USE JETTER TRUCK TO REMOVE THE BUILD UP
- PUT SYSTEM BACK IN SERVICE
- PERFORM VIDEO INSPECTION UNDER THE RIVER



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DRAINING TRANSMISSION MAIN





JETTER TRUCK

- 120 GPM JETTER
- WARTHOG JETTER WITH ROTATING BLADES
- TANKER TRUCKED THE WATER TO USE WITH THE JETTER





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CLEANING TRANSMISSION MAIN





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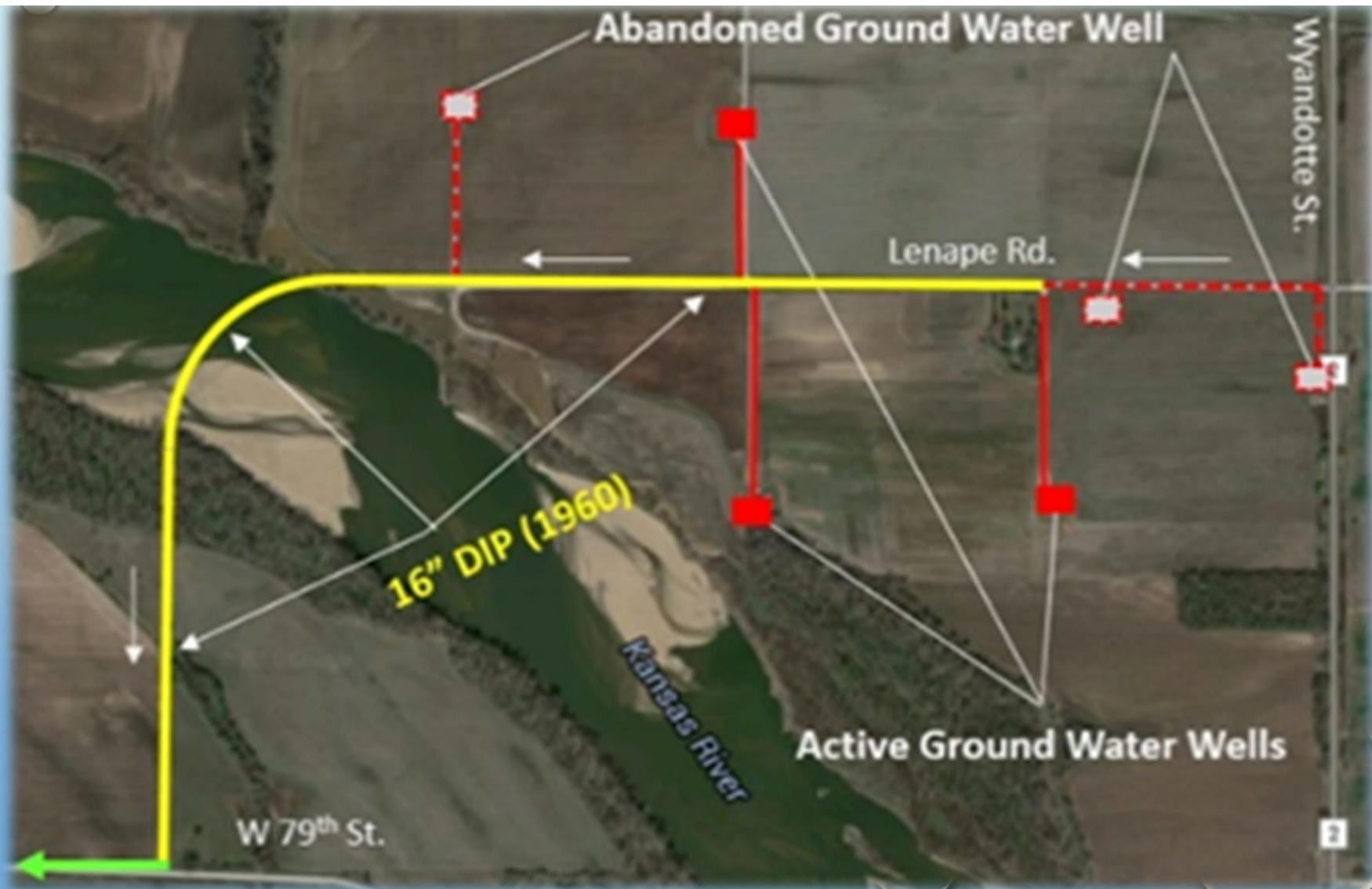
CLEANING TRANSMISSION MAIN





REVISED SCOPE - CLEANING CONCLUSIONS

- CITY WATER DEPARTMENT FORCES
 - RESERVED WATER FOR 5 DAYS OUT OF SERVICE, BUT HIGH DEMAND PERIOD
 - DIDN'T TELL OTHER CITY DEPARTMENTS
 - PUBLIC WORKS – ROAD DUST CONTROL
 - PARKS – IRRIGATION
 - PUT WELL FIELD BACK INTO SERVICE BEFORE CLEANING COMPLETION
- 120 GPM JETTER WAS LIMITED IN ITS CLEANING
 - PERFORMED FOR LEVEL PIPELINE AREAS
 - LONGEST OVER 1700 FT CLEANED
 - ELEVATION CHANGES RIVER APPROACH JETTER COULD NOT ADVANCE
 - OTHER IMPEDIMENTS TO JETTING?





REVISED SCOPE-REVISED CLEANING

- ELEVATION CHANGES UNDER THE RIVER COULD NOT ADVANCE ANYMORE?
- WERE THERE OTHER IMPEDIMENTS TO JETTING?
- NEXT PHASE OPTIONS:
 - LARGER JETTER TRUCK VS.
 - PIGGING



Cleaning Options

Pigging is a process that removes debris and cleans the inside of the pipe using a device called a pig that is propelled through the pipeline by the normal flow. Pigs are usually cylindrical or spherical to aid movement and efficient cleaning.





Revised Scope-Revised Cleaning

- **DEBATE**
 - **PIGGING VS. BIGGER JETTER TRUCK**
- PIGGING - SOFTER PIGS - INCREASE SIZE AND RIGIDITY
 - PROS
 - SOFT PIGS COMPRESS AND BREAK UP; WON'T GET STUCK
 - LESS EXPENSIVE
 - CONS
 - REQUIRES LOTS OF WATER TO MANAGE
 - CAN'T TRACK LOCATION
 - SET UP A LAUNCHING STATION



Revised Scope-Revised Cleaning

- **DEBATE**
 - **PIGGING VS. BIGGER JETTER TRUCK**
- **BIGGER JETTER TRUCK**
 - **PROS**
 - LESS WATER TO MANAGE
 - TRACK PROGRESS WITH LENGTH OF HOSE
 - **CONS**
 - MORE EXPENSIVE
 - MOBILIZE FROM NEW JERSEY
 - POTENTIAL TO GET HOSE CAUGHT IN COLLAPSING DEBRIS
- **FINAL DECISION**
 - CLIENT WAS MOST COMFORTABLE WITH THE JETTER TRUCK



JETTER TRUCK

- 1800 FT JETTER HOSE
- 1.5 INCH ID HOSE
- 190 GPM
- PUMP FROM RIVER
- LIGHTER PROFILE NOZZLE
- “PENETRATOR NOZZLE”
- DRONE SURVEY







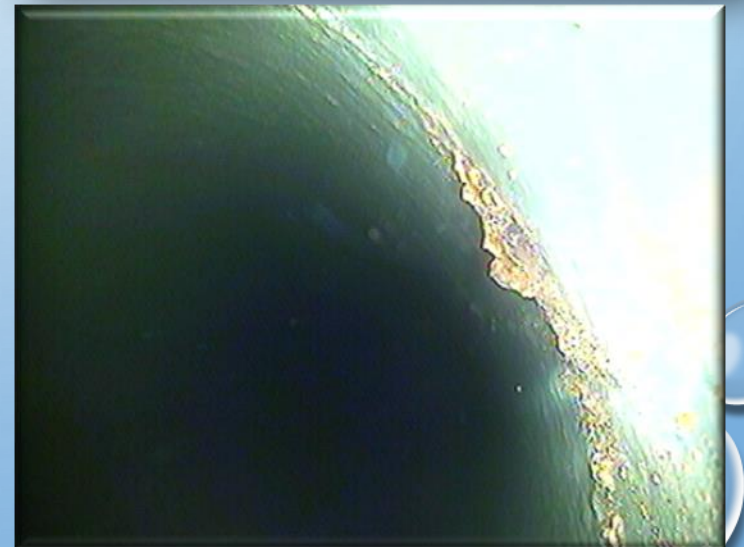
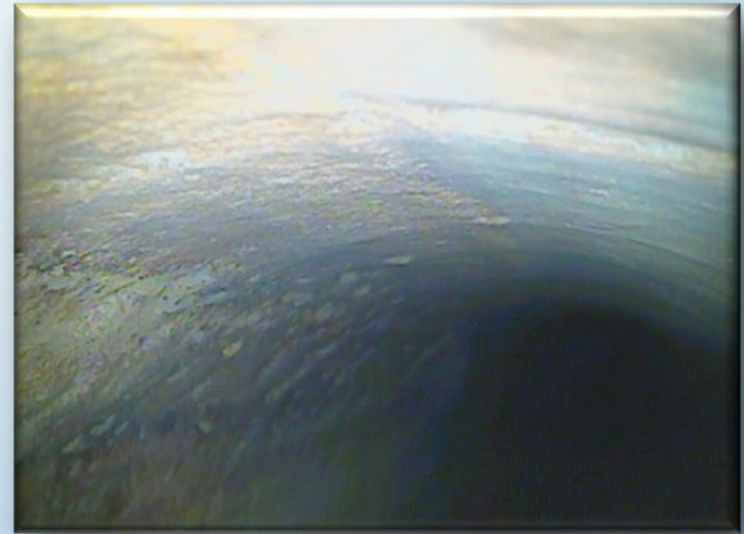
REVISED CLEANING - CONCLUSIONS

- BIGGER JETTER TRUCK
- CLEANING WAS SUCCESSFUL
- PIPE CONDITION WAS EXCELLENT





Condition Category	Rating	RUL
Exterior of Pipeline	Very Good	>20
Interior Pipe Wall/Barrel	Very Good	>20
Interior Cement Lining	Good	10-20
Pipe Joints	Good	10-20
Well Laterals (north side)	Good	10-20
Valve Vault	Average	<5
Hydraulics	Very Good	160 psi
Long-Term Plan	Schedule	Cost
Phase I and II (completed)	2016	\$109,000
Inspect remaining pipeline	Fall 2017	\$325,000
Modify north valve vault	2017-18	\$5,000
Install permanent cleaning structures	2017-18	\$75,000
PMP – Cleaning Schedule	Biannual	
PMP – Inspection Schedule	10 Year	





Next Phase-South of Kansas River

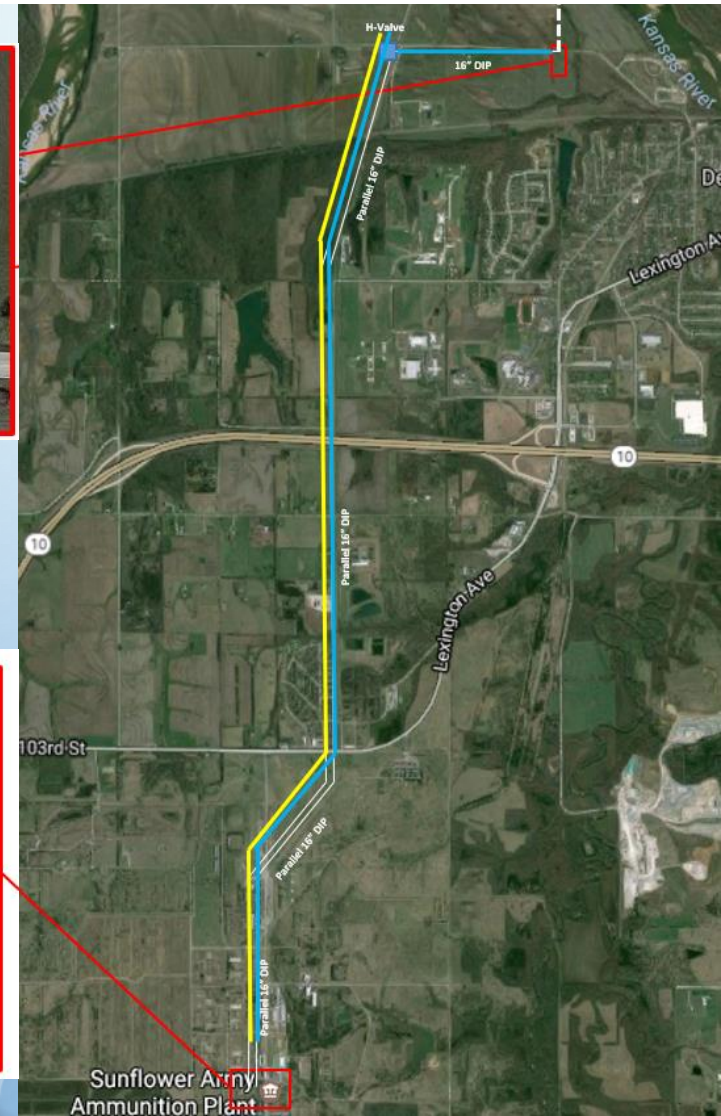
Total Pipe Length – 51,800'

Schedule: December - January

Scope: Clean/Inspect/Modify

Cleaning Method: Pigging

Updated Report: February



QUESTIONS?



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**MAKE SURE
YOUR TOOL
BOX IS FULL!**