

# Workgroup #1

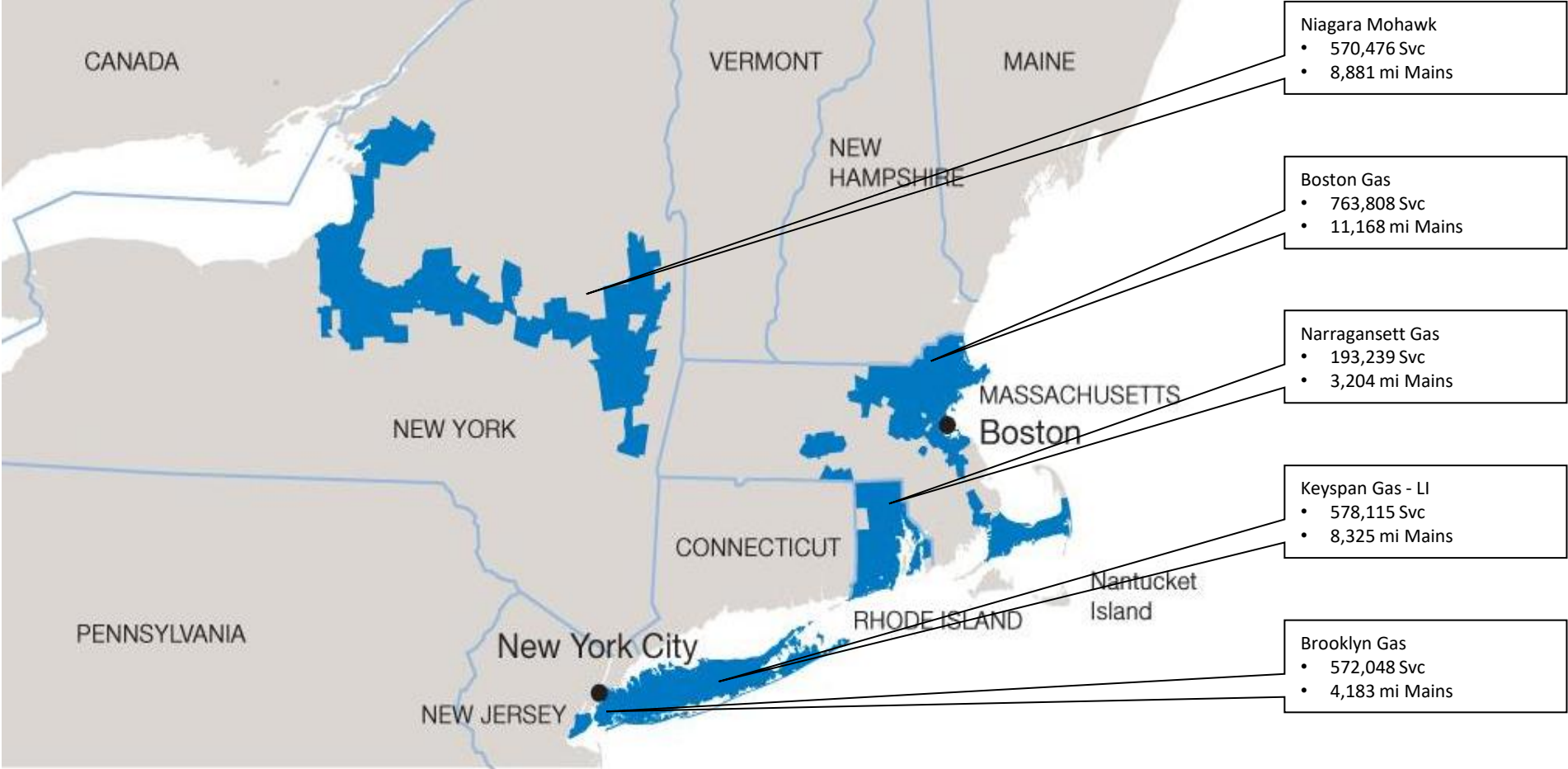
## Rehabilitation of Aging Cast Iron Pipelines

Saadat Khan P.E.  
December 1<sup>st</sup> 2021

**nationalgrid**

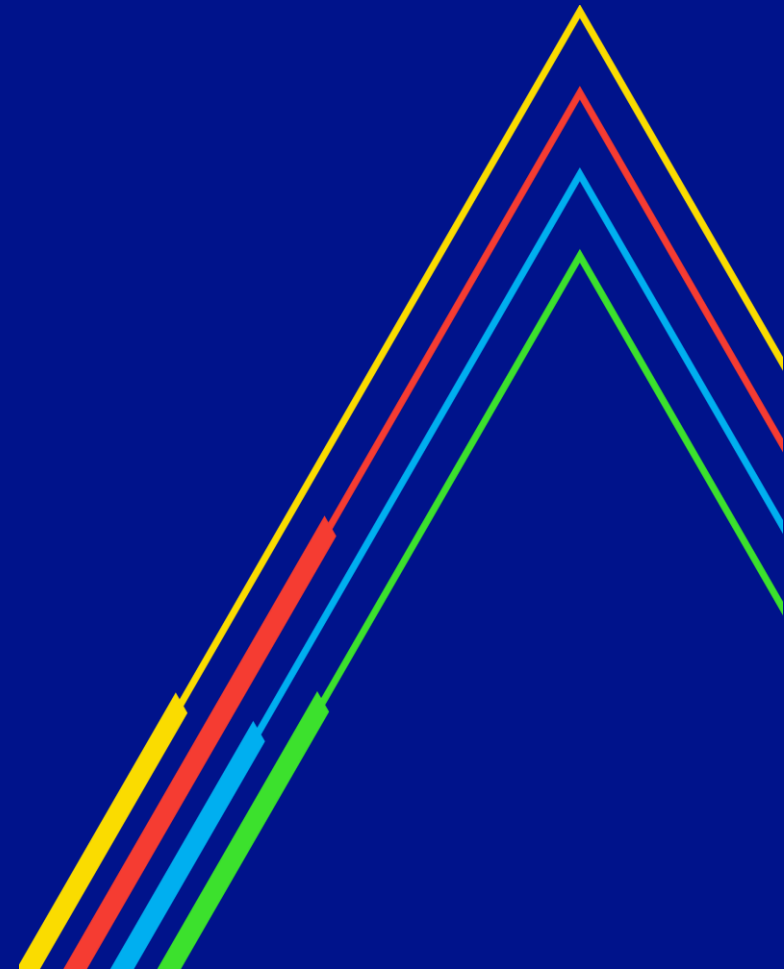


# Service Territory & Operating Companies



# A Closer Look At Cast Iron Mains Inventories

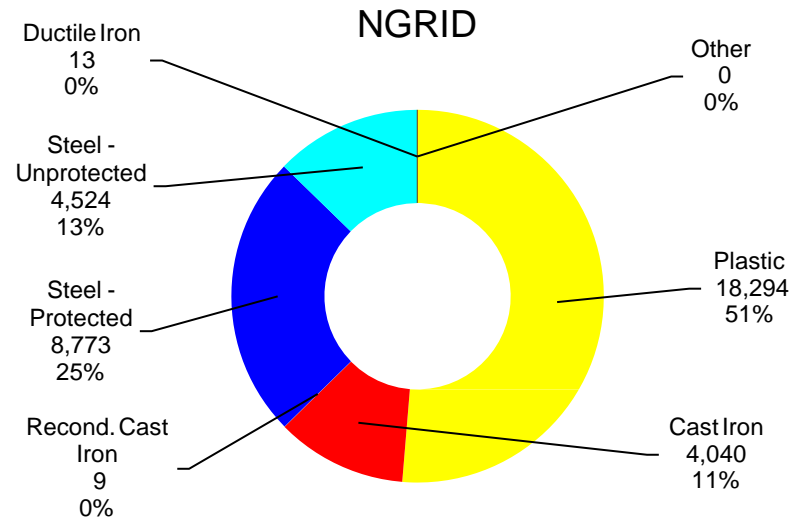
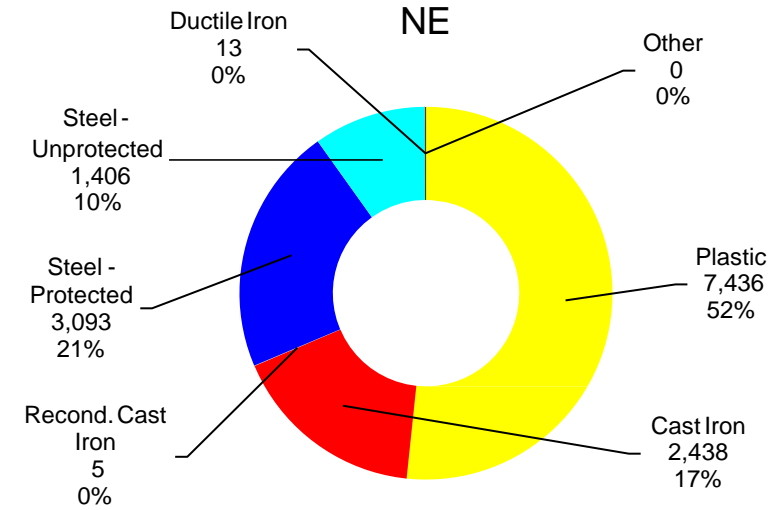
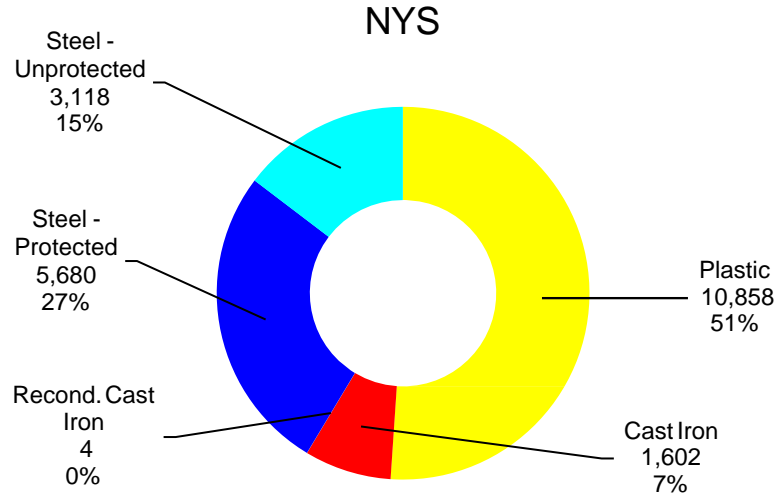
nationalgrid



# Main Inventory

2020

# NGRID



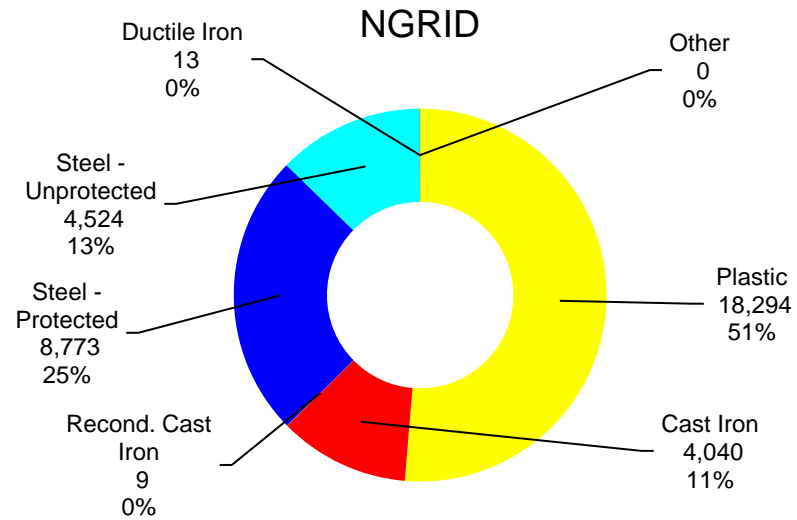
# Main Inventory Vs. PHMSA

2020

# NGRID

## National Grid – US

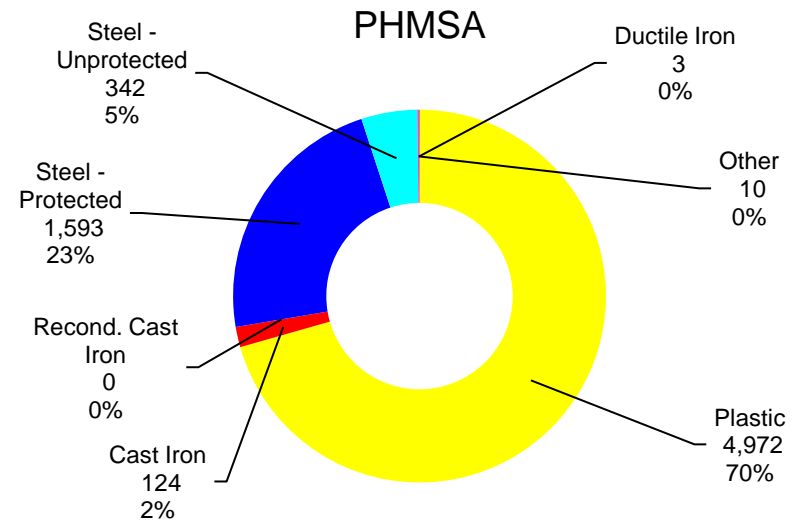
35,654 Miles



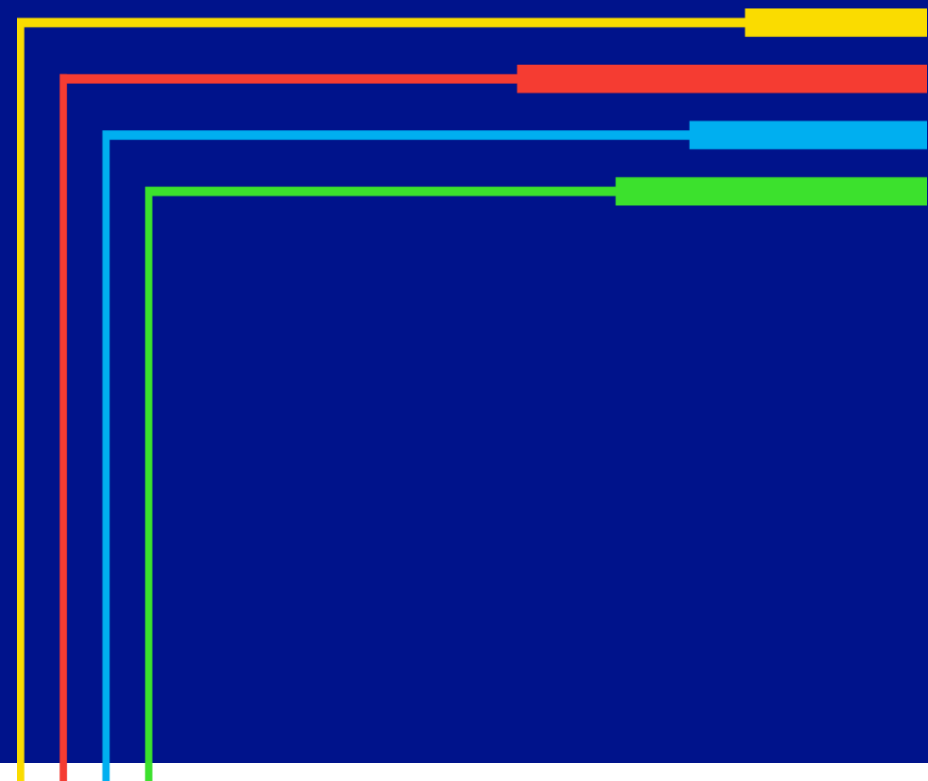
## 2020 PHMSA Average

(Excluding National Grid)

- 125 Companies (2,000+ Miles of Main)
- 8,678 Miles of Main Per Company



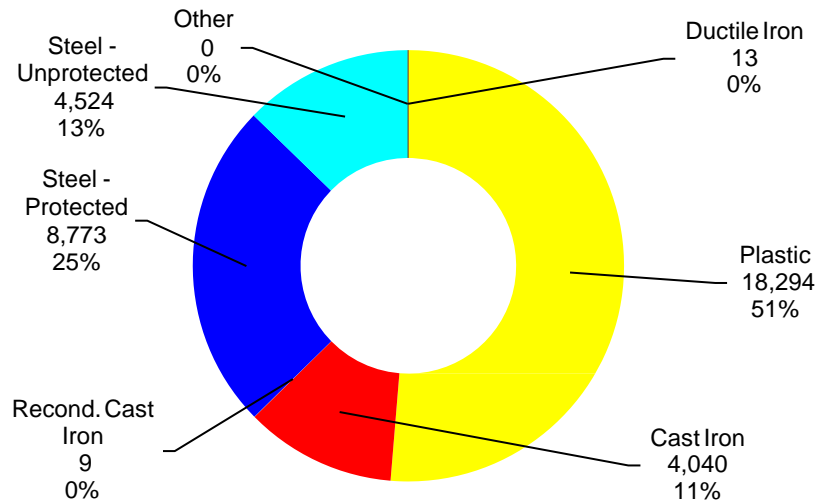
# Cast Iron Main Leak Repairs



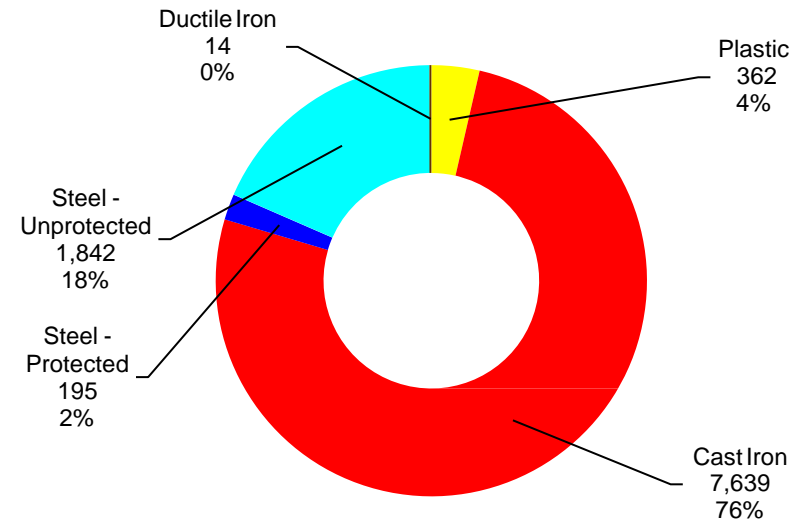
# Main Inventory Compared To Main Leak Repairs By Material

# NGRID

## Main Inventory

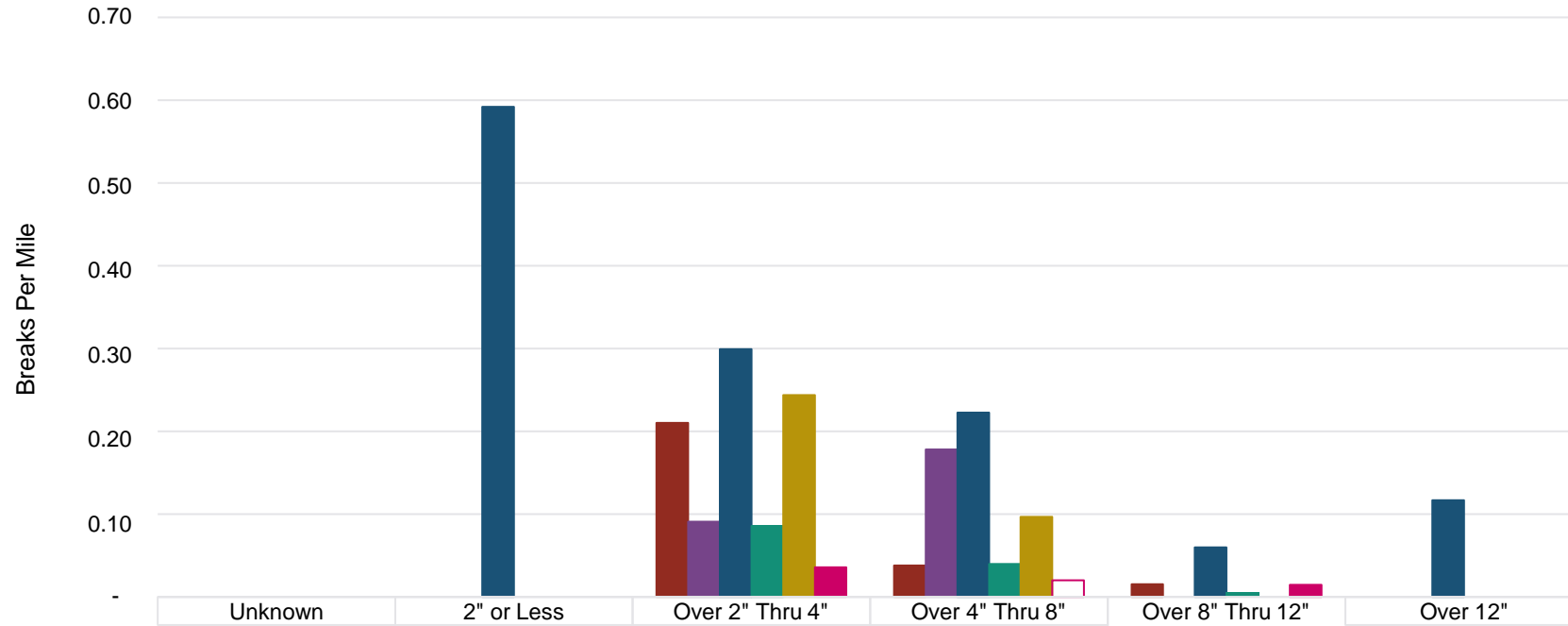


## Main Leak Repairs



# Cast Iron Main Break Rates (Comparison By Diameter)

# NGRID





# Company Inventory of CI By Region



CAST/WROUGHT IRON						
	2" OR LESS	OVER 2" THRU 4"	OVER 4" THRU 8"	OVER 8" THRU 12"	OVER 12"	SYSTEM TOTALS
Company 1	0	33	129	8	3	173
Company 2	1	138	715	194	102	1,151
Company 3	2	87	149	34	9	279
Company 4	16	636	788	230	109	1,778
Company 5	2	252	301	69	37	660
<b>Total</b>	<b>20</b>	<b>1,146</b>	<b>2,081</b>	<b>534</b>	<b>260</b>	<b>4,040</b>

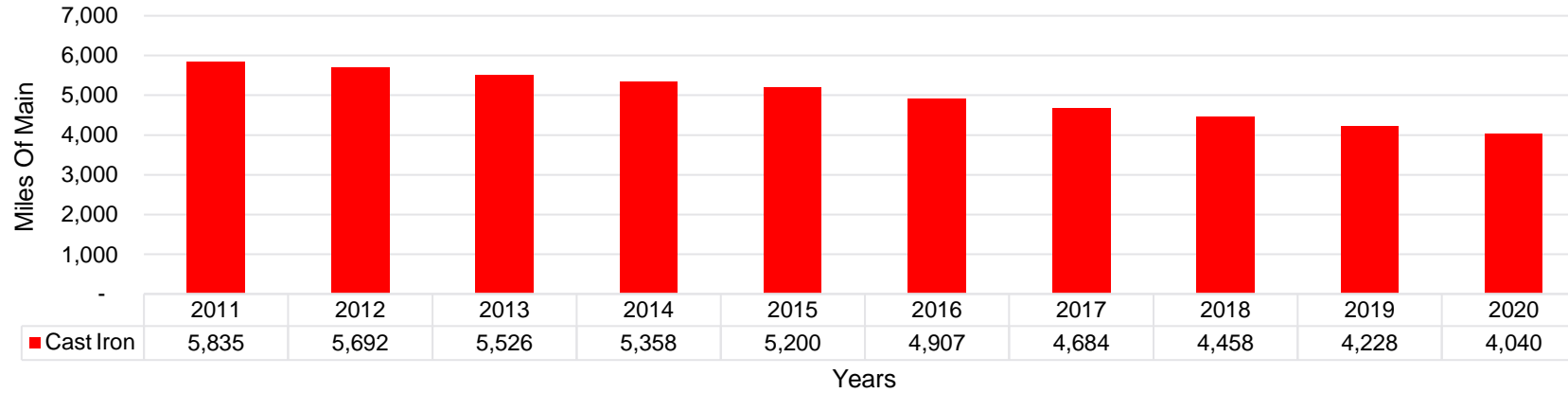
# Company Cast Iron Strategy

- Replace 12" and smaller worst performing CI pipe a year
- Replace or rehabilitate greater than 12" CI pipe, using CISBOT or Lining
  - Greater than 12" CI pipe has low probability to break due to higher beam strength
  - Lining is a preferred strategy to rehabilitate CI
  - CISBOT is used where main can not be taken out of service and have too many services connected to the section of main

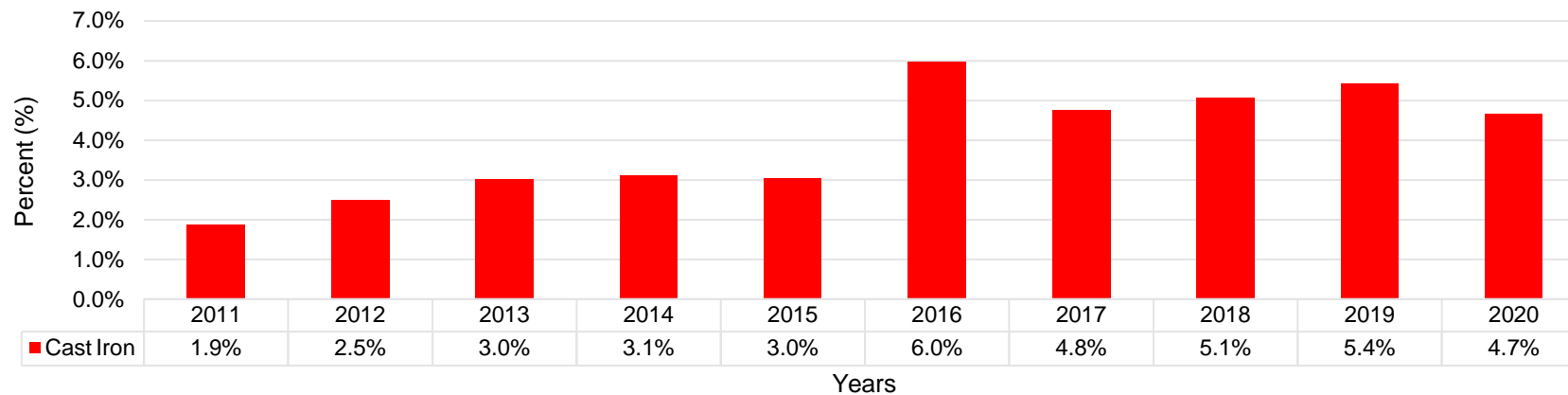
# CI Main Inventory Compared to CI Attrition Rate



## Cast Iron Main Inventory

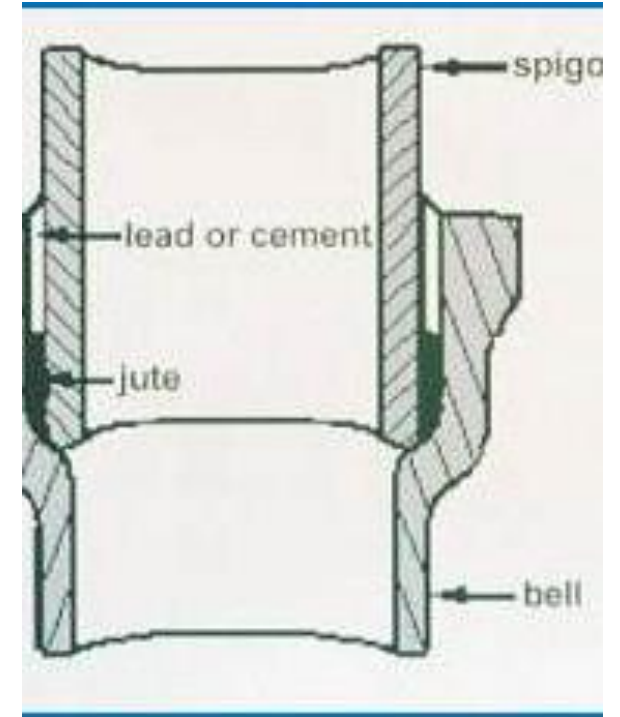


## Cast Iron Reduction Percentage



# CISBOT

- The CISBOT is a special robotic technology created to rehabilitate cast iron Joints.
- The CISBOT injects a sealant into the bell joints in the cast iron main that prevents and repairs leaks for 50+ years.
- One huge advantage of using the CISBOT is that the robot works in a live gas main, so customers are not affected by the work.
- We have sealed over 15 miles and plan to do 3-4 miles a year



# Cure-in-Place (CIP) Lining

- Technology developed early 1990s to line metallic pipelines from 4" to 48".
- The liner extends the life of the main for additional 50 -100 years.
- Tested by NGA, Cornell and participating gas companies with funding support from PHMSA
- The Starline liner is a circular woven fabric-hose made of polyester yarns that unfolds inside the pipe and cures using a two-component adhesive
- National Grid has 12 miles of cast iron mains lined.



# Conclusion

- CISBOT and lining technologies are effective and reduce cost
- CISBOT can not be used for 12” and smaller pipe due to high probabilities of breaks

## Future developments:

- Need more lining technologies, cost effective for 12” and smaller CI mains
- Better technologies to find and cut holes for services and off sets
- CI mains are only rated for 25 psi MOAP, may need to change codes for lined pipes to allow higher pressures
- Extend lining materials and processes steel pipes

Thank You

