Direct Emission Measurements on Cast Iron Pipe

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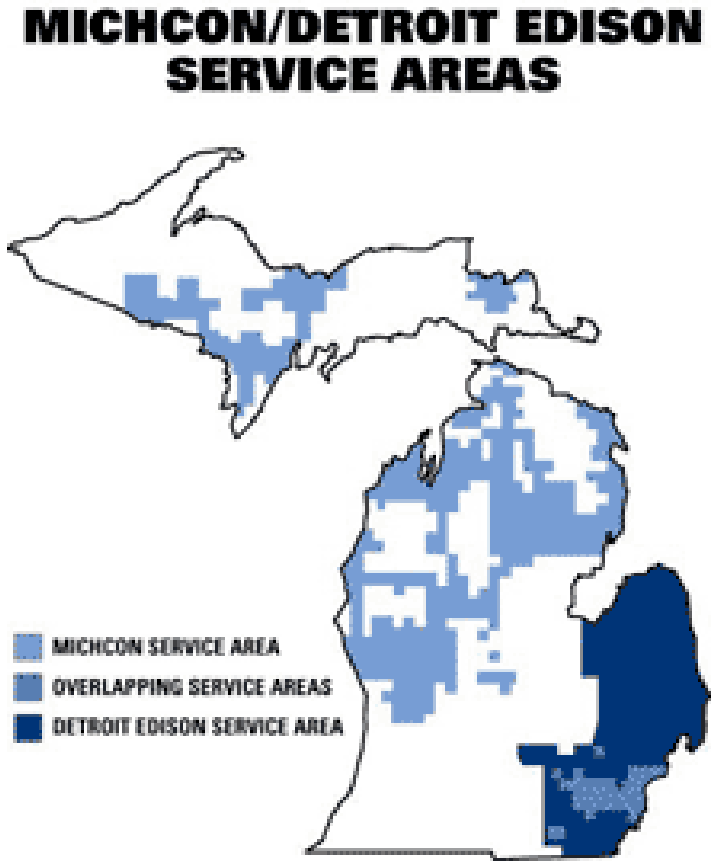
OVERVIEW

- **Background**
- **Use of Hi-Flow Gas Sampler**
- **Second Study**
- **Going Forward**

DTE Energy - MichCon

- **DTE Energy is one of the nation's largest diversified energy companies.**
- **Its largest operating units are Detroit Edison, an electric utility serving 2.2 million customers in SE Michigan, and MichCon, a natural gas utility serving 1.3 million customers in Michigan.**
- **MichCon, founded in 1849, is the fifth largest natural gas utility.**
- **MichCon is able to store 130 billion cubic feet of gas in naturally occurring underground rock formations.**



What is the issue?

- **Cast Iron Pipe Replacement Program – 2500 Miles in 50 Years**
- **Increased Focus on GHG – Should we use emissions to help us prioritize?**
- **Little Emissions Data is available on Underground Pipe**
- **GRI/EPA study dated June, 1996**
- **MichCon Needs Better Quality Data!**

Why does cast iron pipe leak?

- **Bell-and-spigot joints that connect pipe sections together tend to leak as pipe ages.**

- **Corrosion of pipe may also be an issue.**

Factors Affecting Leak Rate - GRI/EPA Study

- **Stratifying variables were identified as:**
  - **Pipe use (service versus mains)**
  - **Pipe materials**
  - **Pipe age**

Factors Affecting Leak Rate - GRI/EPA Study

- **Additional Factors:**
  - **System leak detection and repair programs**
  - **Pipe operating pressures**
  - **Distribution soil characteristics**
  - **Pipe diameter**

•EPA/GRI Test Procedure

- **Leak was identified**
- **Segment to be tested was capped off at the service-to-main connection**
- **A short segment of main (20 feet long) with a detectable leak was isolated or**
- **A longer segment with multiple leaks was isolated**
- **Cast iron pipe was slightly different as many sections have undetected leaks**
- **Gas was metered to the section and the gas flow rate required to maintain pressure was recorded**
- **Separate work was completed on the oxidation of methane in soil**

MichCon Emissions Study

- **MichCon worked with Heath Consultants to establish a protocol for measuring leaks in underground pipe using a high-flow sampler.**
- **The study included:**
  - **Selection of several sites with different characteristics (similar to the GRI/EPA study)**
  - **Use of three different methods of enclosing leaks**

Funnel Method

Issues associated with sampling

Funnel Method –

- **Many did not produce any measured sample**
- **May have been issues with the seal to the ground**
- **May have been venting over a wider range – even at the curb**
- **Cannot be used on city streets**
- **Sampling could be improved with a much larger funnel**

3-Hole Sampling Method

Issued associated with sampling

Direct Measurement – 3-Hose Sampling Method

- **Produced results – but still not sure entire leak was captured**
- **Even with this method, not sure steady-state was reached and pooled gas was not being measured**
- **MichCon employees felt maybe gas was being pulled out of pipe**

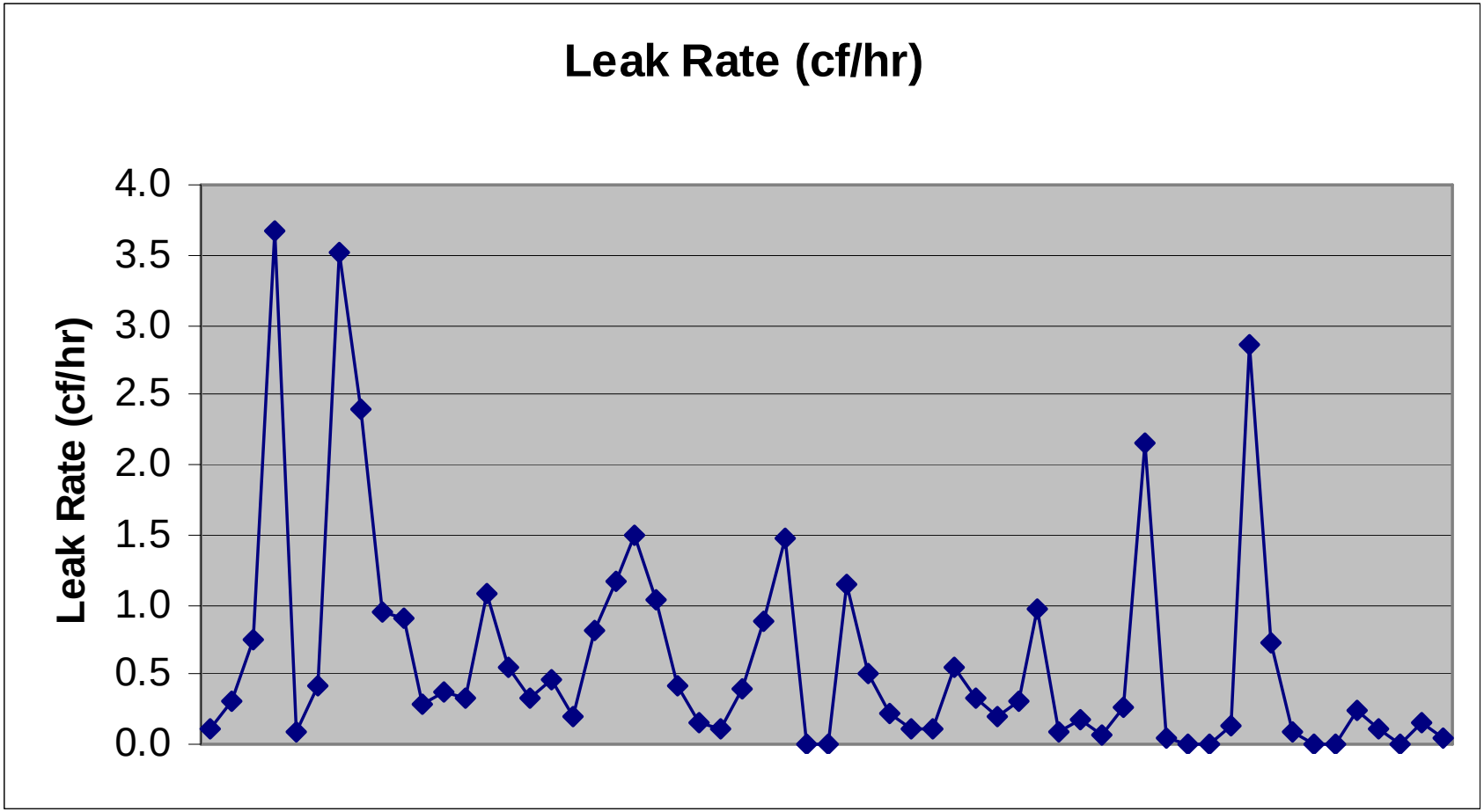
Tarp Enclosure Method

Issues Associated with Sampling

Tarp Enclosure Method –

- **Need to test outside of tarp area to ensure all gas was captured**
- **Problems in areas between the curb and sidewalk**
- **Issues with seal to the ground**
- **Need a larger sample to adequately determine effectiveness**

Leak Rate from Funnel Measurements

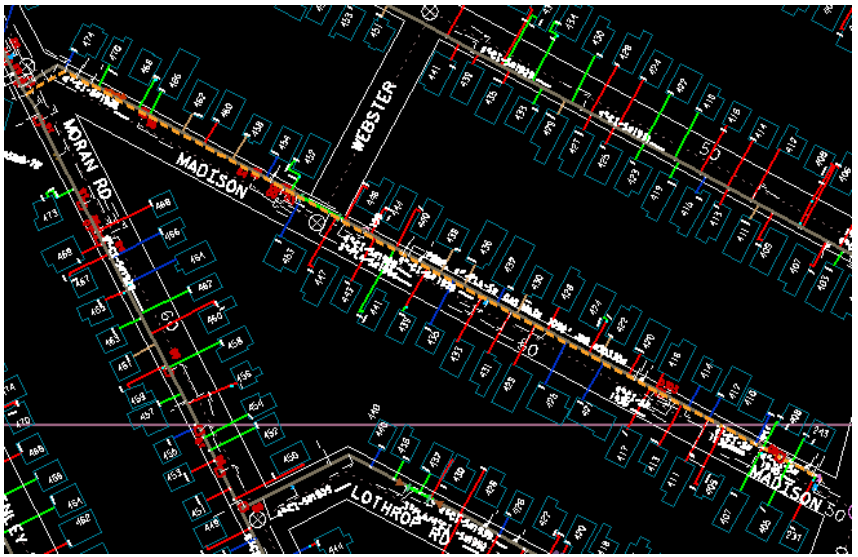


Cast Iron Pipe Emissions Data

- **GRI/EPA – 238 Mcf/mile**
- **DTE – 21,595 Mcf/mile**

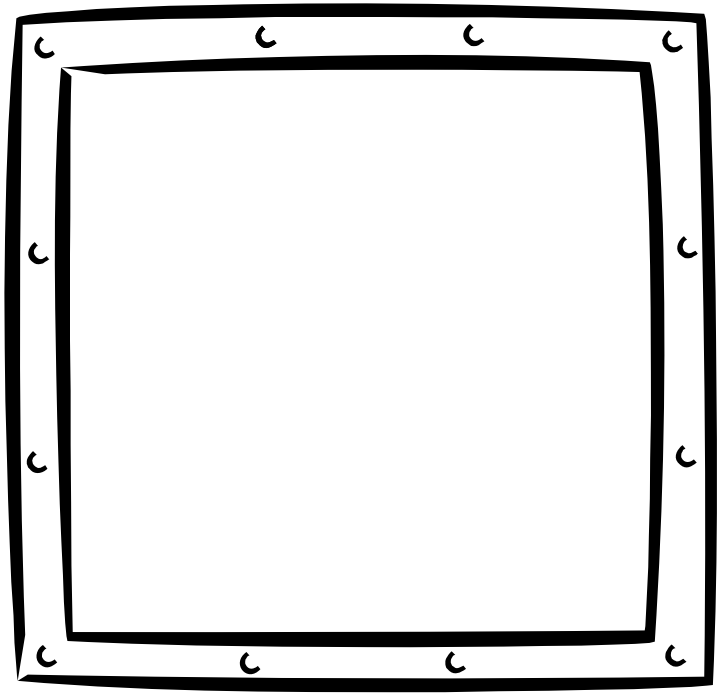
Emissions Study

- **As main services were renewed, service was transferred to the new main**
- **Meter was installed between the soon-to-be abandoned main and the existing system**
- **Gas to the isolated system was measured for 1.5 weeks to determine the leak rate**
- **One system – 0 gas leaks (580 feet)**
- **Second system – 16.7 cf/hr (1150 feet)**
- **Similar repair histories, etc.**



Going Forward

- **Additional main renewal emissions collection**
- **Better Repair History Tracking**
- **Additional Information on Leaks Collected**
- **Newer Technologies?**



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Any Questions?


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