

Mobile and Continuous Monitoring Panel CH₄ Connections Conference

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DISTRIBUTION ENGINEERING

We have the
energy
to make things work
... for you.



PSEG

We make things work for you.

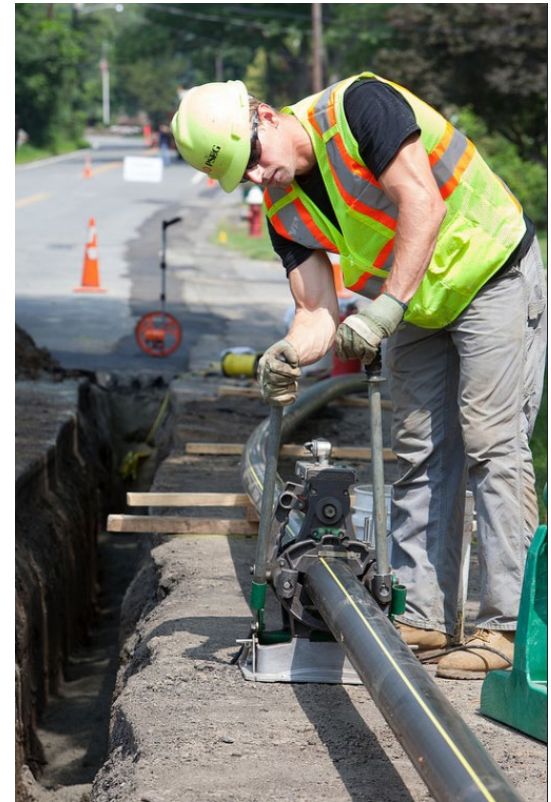
Getting to know PSE&G



- Combined electric and gas utility
- 6th highest gas utility in US sales
- Serves 10 of the top 15 cities in NJ
- ~2,400 employees
- 17,955 miles of gas distribution main
- 57 miles of gas transmission main
- 1.2 million gas services
- 1.8 million gas customers
- Sales volume growth: ~1% per year

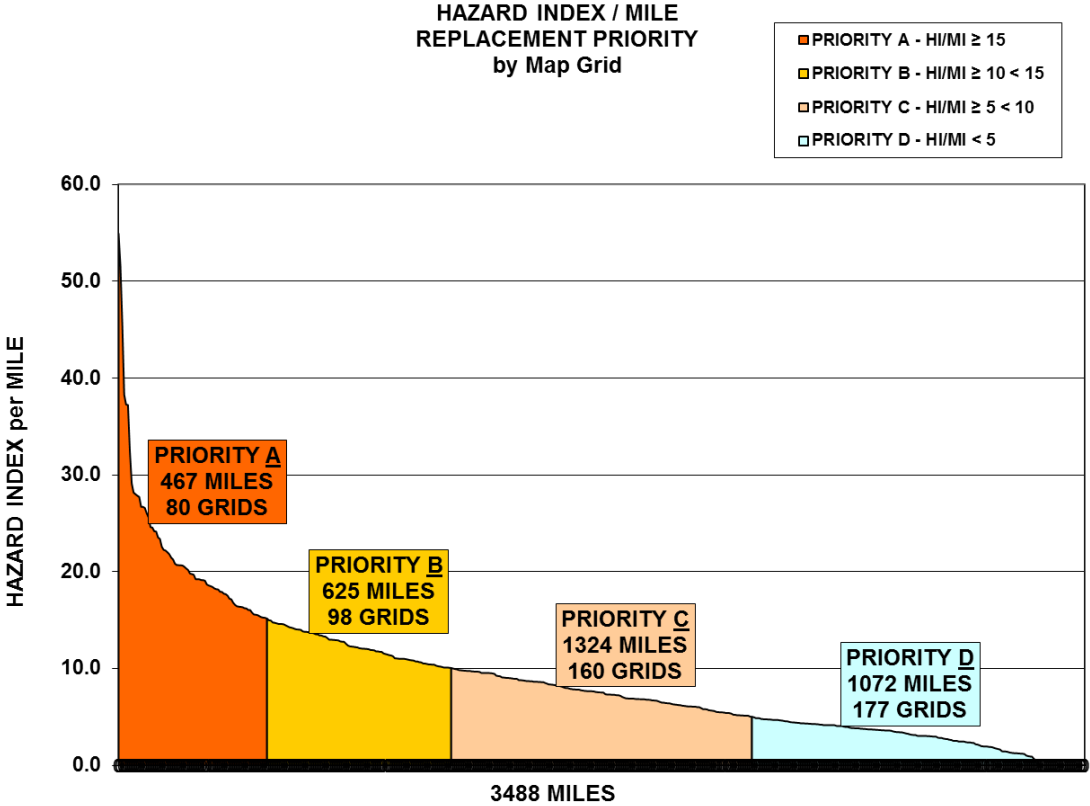
PSE&G's Involvement with Mobile Mapping

- PSE&G currently operates and maintains one of the largest inventories of cast iron and unprotected steel gas distribution main at 4,440 miles.
- PSE&G filed multiple Gas System Modernization Program (GSMP) filings.
- Successful support of regulators and other stakeholders have enabled two large accelerated replacement programs.
- Supports DOT focus on replacing the highest risk, most leak prone facilities.
- Upgrades legacy low (utilization) pressure systems to medium pressure.
- Relocates inside meter sets to outside.
- Installs excess flow valve (EFV) safety devices.
- Total ~170 miles of main replacement per year over 8 years.



Prioritization of Cast Iron Main Replacement

- Hazard Index (HI) rankings used to express and compare relative hazard for main segments having a history of breaks.
- Mileage is based upon total low pressure cast iron mileage in grid



Incorporating Methane Mapping into Prioritization

- PSE&G partnered with the EDF, Google, and Colorado State University to perform methane mapping for GSMP I and with Picarro and EDF for GSMP II.
- A vehicle equipped with state of the art methane and meteorological sensors was driven repeatedly along streets with cast iron natural gas pipelines targeted for replacement to map emissions

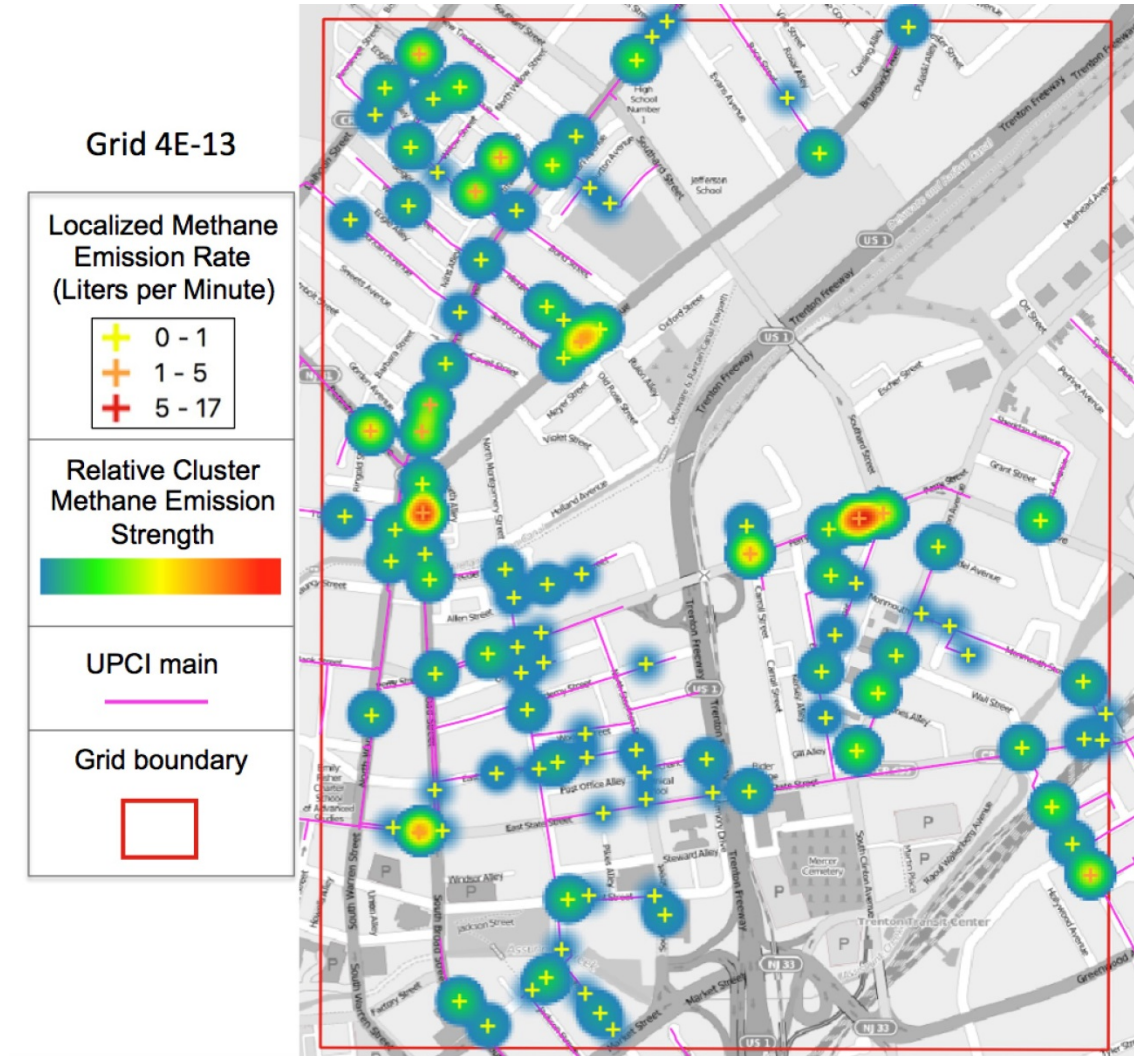


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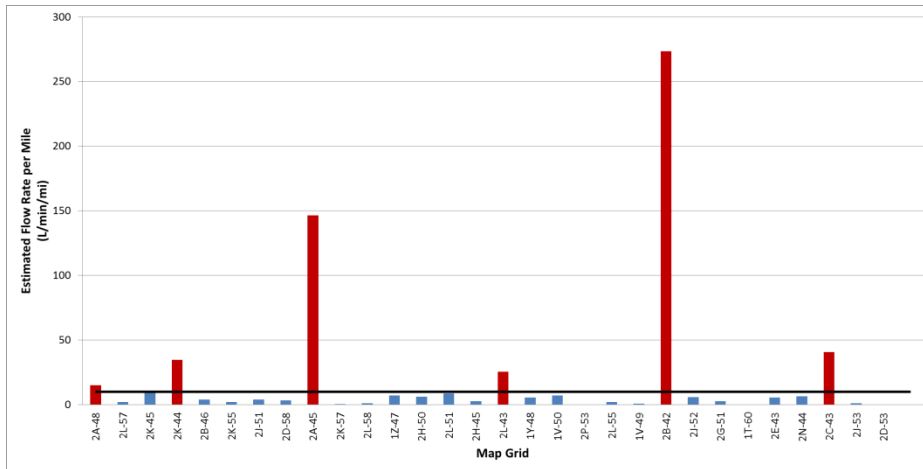
Methane Quantification Survey

- Areas generally require 3 passes on each side of the street over multiple nights for proper sampling.
- Indications are run through an algorithm with wind, vehicle speed, ethane content and other factors to determine leak rates
- Heat maps can show areas of high emissions and calculated leak rates

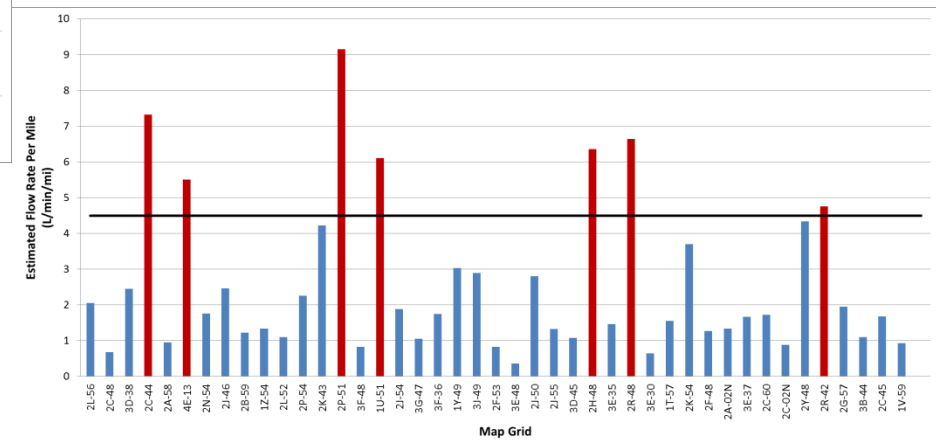


Methane Mapping Results

Program	Miles	Grids	Grids Accelerated
GSMP I	175	30	5 of 6
GSMP II	275	44	6 of 7
TOTAL	450	74	



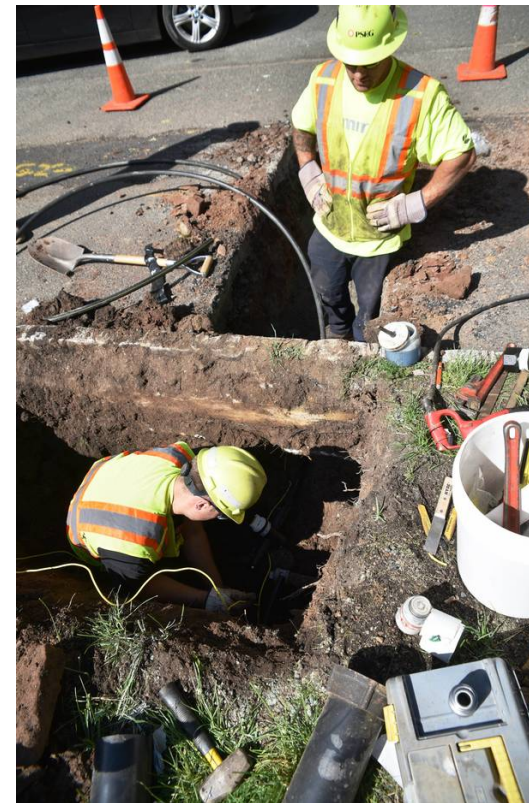
GSMP I



GSMP II

Methane Mapping Benefits

- Hybrid methodology allows a focus on risk reduction while maximizing methane emission reduction
- Mains retired earlier than originally planned stop emitting methane faster
- GSMP I
 - By accelerating higher emission grids, PSE&G captured a 37% reduction through the abandonment of 9% of the mileage surveyed.
- GSMP II
 - By accelerating higher emission grids, PSE&G will capture a 41% reduction through the abandonment of 16% of the mileage surveyed.



Overall Challenges

- Logistic issues with municipalities
 - Permitting, restoration requirements, other construction coordination, paving moratoriums
- Sequencing of the work
 - Disruptions to the public
 - System Integrity
- Delay in real-time emission data

Gas System Modernization Program
WORK PHASE 1 – Dig Trench



Gas System Modernization Program
WORK PHASE 2 – Install New Pipes



Gas System Modernization Program
WORK PHASE 3 – Connect Service Lines



Gas System Modernization Program
PHASE 4 – Final Road Restoration



Questions?