# Monitoring Threats
# Are Your Leaks Attached to Your Pipes?

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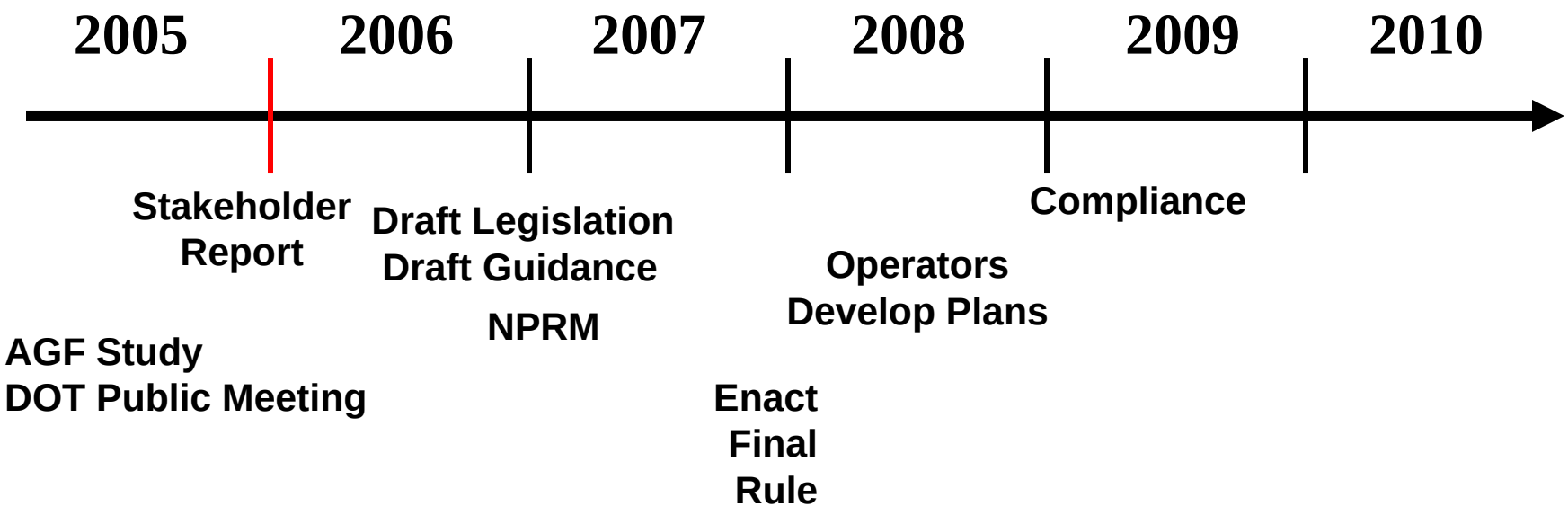
# Overview

- Why do I care about DIMP?
- Locating Leaks
- Leak Management at Centerpoint Energy
- Legacy Leak Geocoding and Pipe Association

# DIMP Timeline

- Draft legislation and guidance by
  - December 2006
- Public comment and enactment by end of 2007
- Write and implement plans in 2008
- Compliance by 2009



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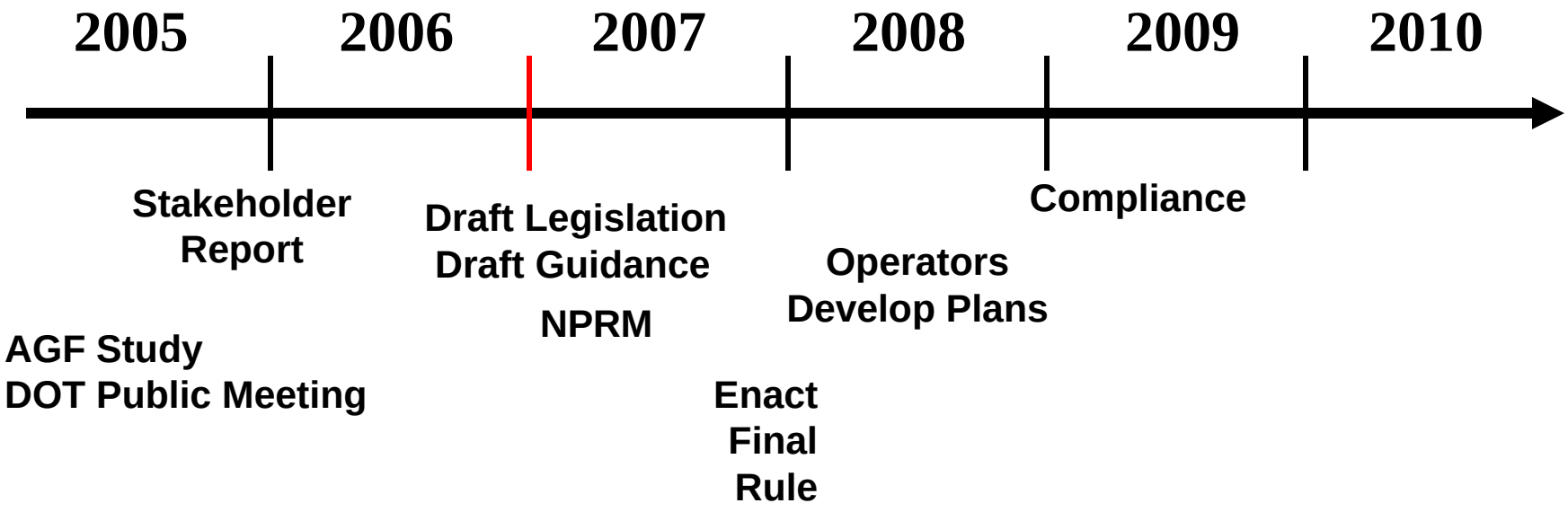

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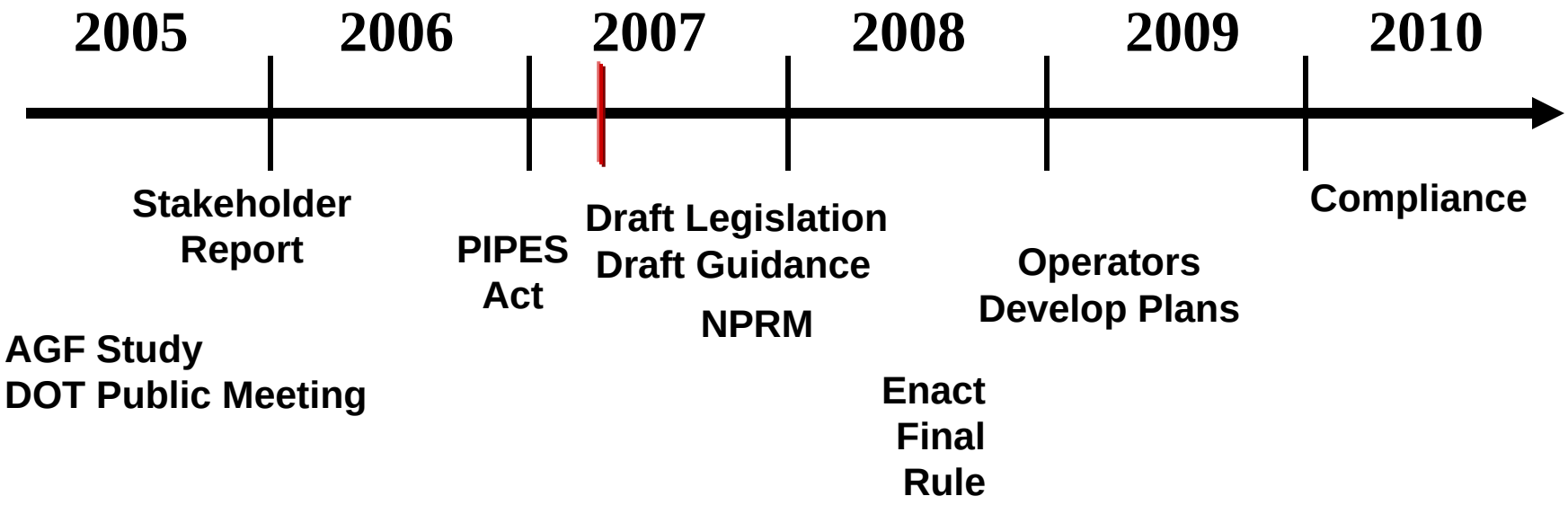

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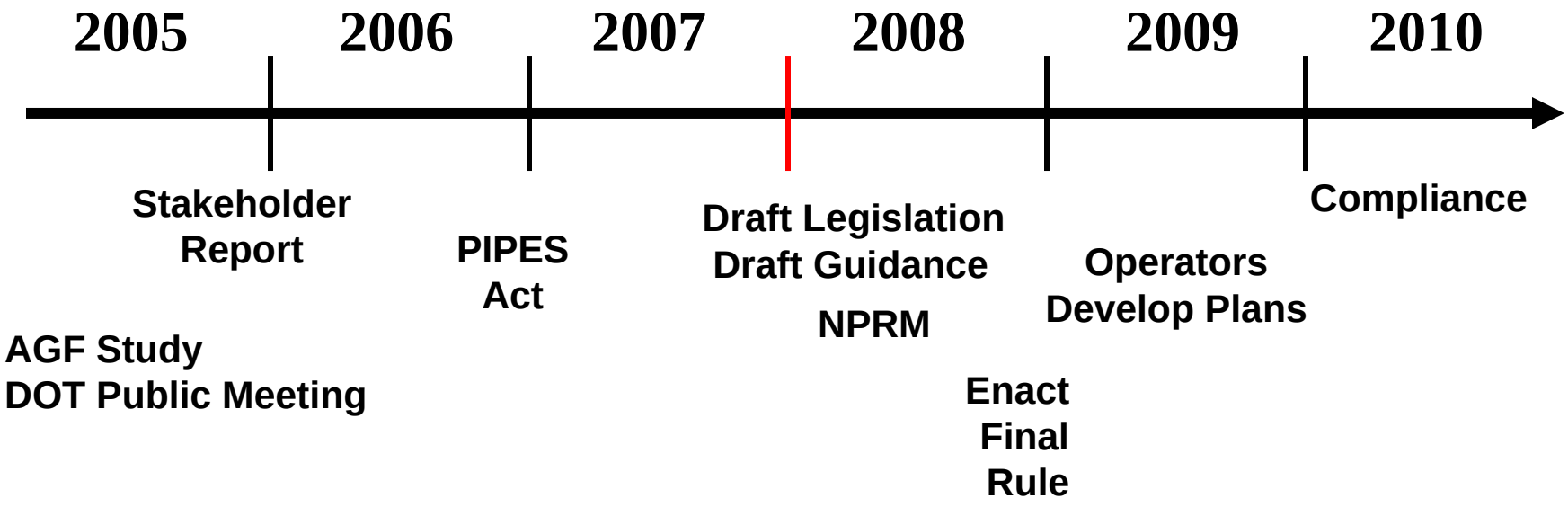

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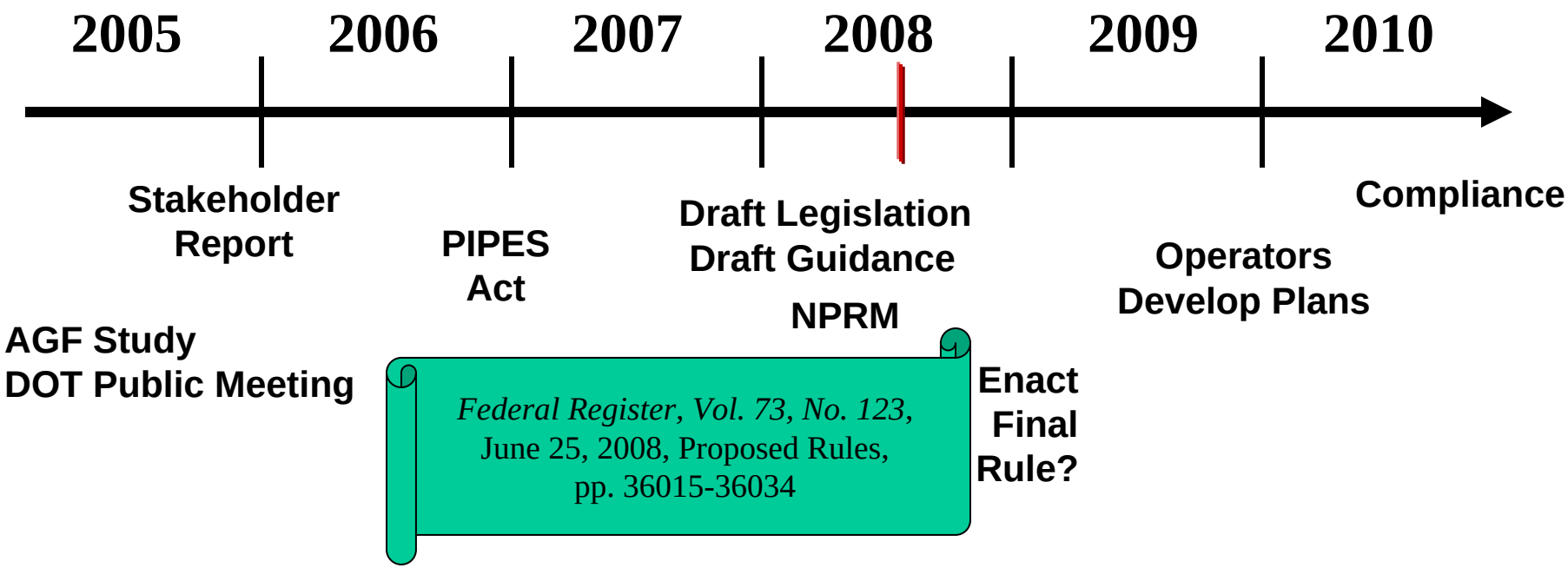


# Understanding Your Infrastructure

- An enterprise GIS can be the primary source of infrastructure knowledge
- DIMP can justify geospatial investments
  - Software acquisition
  - Data conversion
  - Landbase re-alignment
  - Legacy system consolidation

# How Do I Assess Risk?

Probability of Failure X Consequences of Failure


Use infrastructure knowledge and threats

***What's Spatial About That?***

# Effective Leak Management

Source: Integrity Management for Gas Distribution, Report of Phase 1 Investigations, Dec 2005

- An effective leak management program is an important risk control practice
- The essential elements are:

  **L**ocate the leak

  **E**valuate its severity

  **A**ct appropriately to mitigate the leak

  **K**eep records

  **S**elf-assess to determine if additional actions are necessary for system safety

# What Threats Does My System Face?

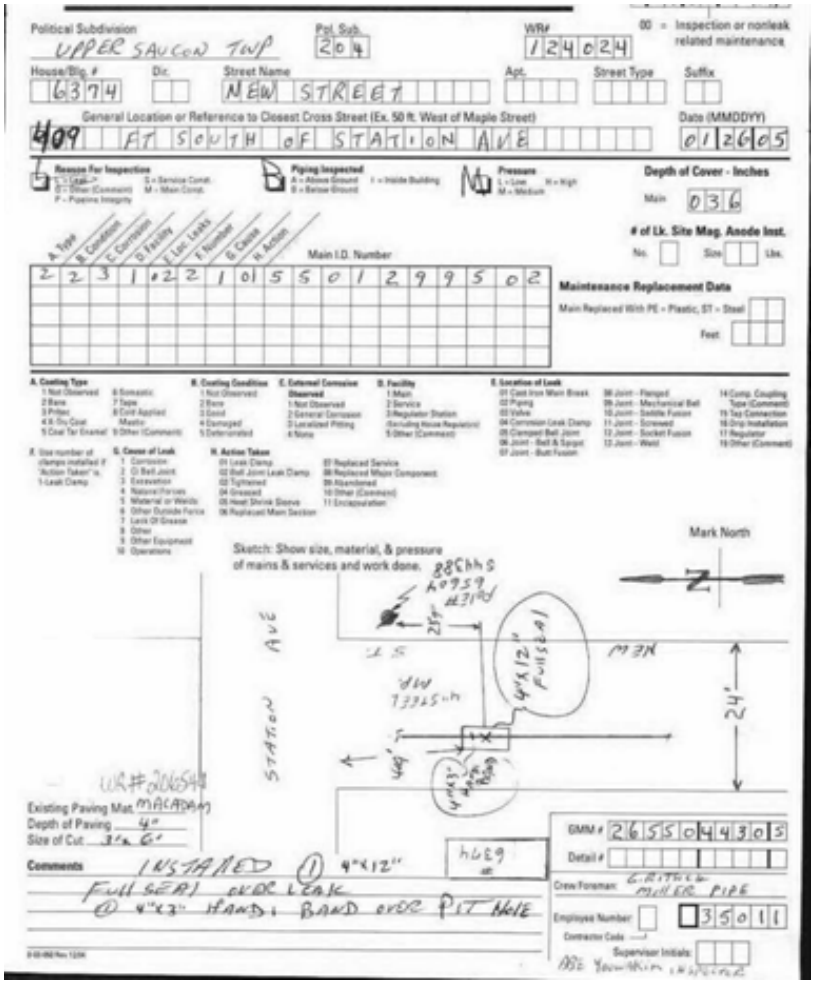
- Where are leaks occurring?  Do we know which specific facilities?
- Where have we collected Pipe Condition Reports?
- Where are we having protection problems?
- Where are people damaging our pipes?
- What information is collected?  Where is it stored?

***Threat Indications Are More Valuable When Integrated With Infrastructure Knowledge***

# Where are your leaks?

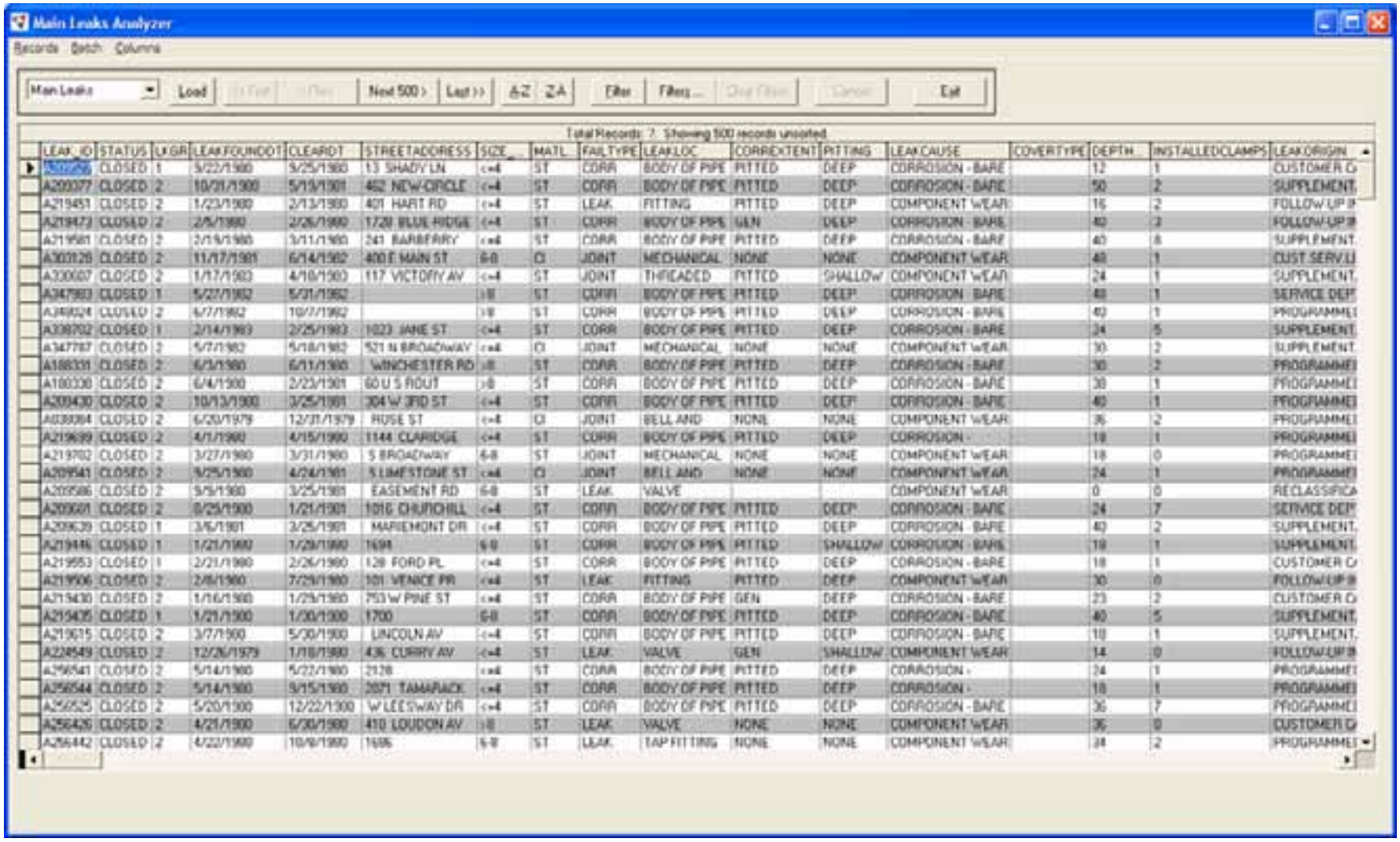
# Repair/Inspection Form

- No city
- No zip code
- Hand sketch and free-form text
- Main ID Number - atypical

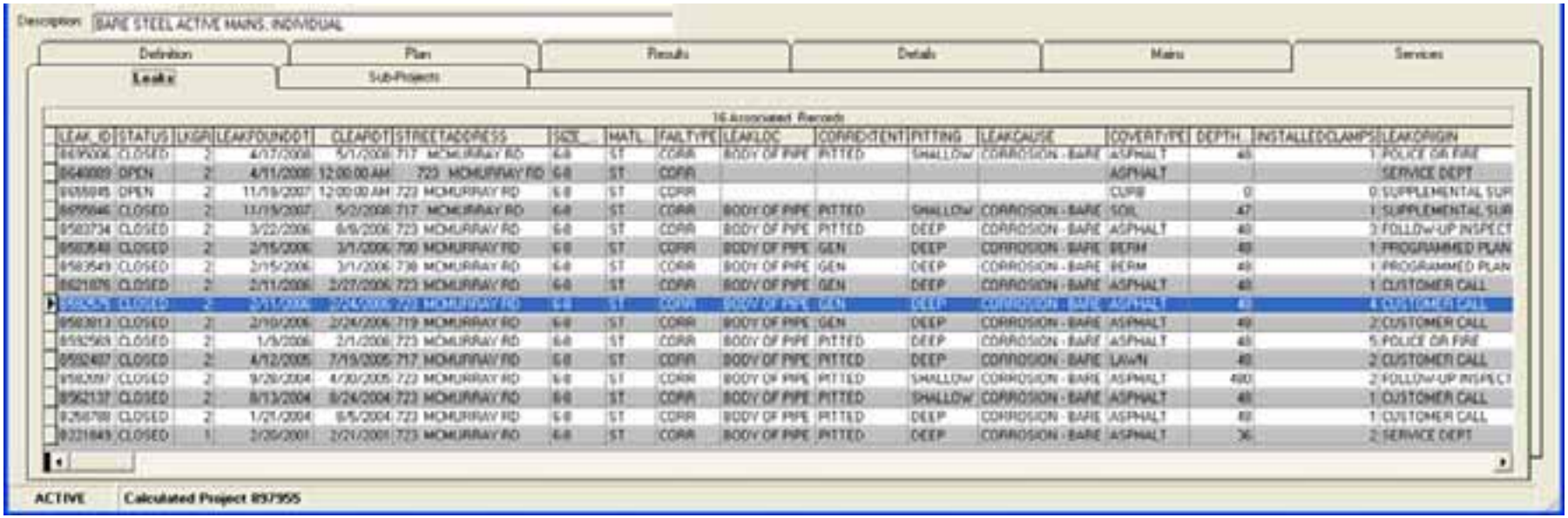


# Tacks on the Wall?

# Tabular Data

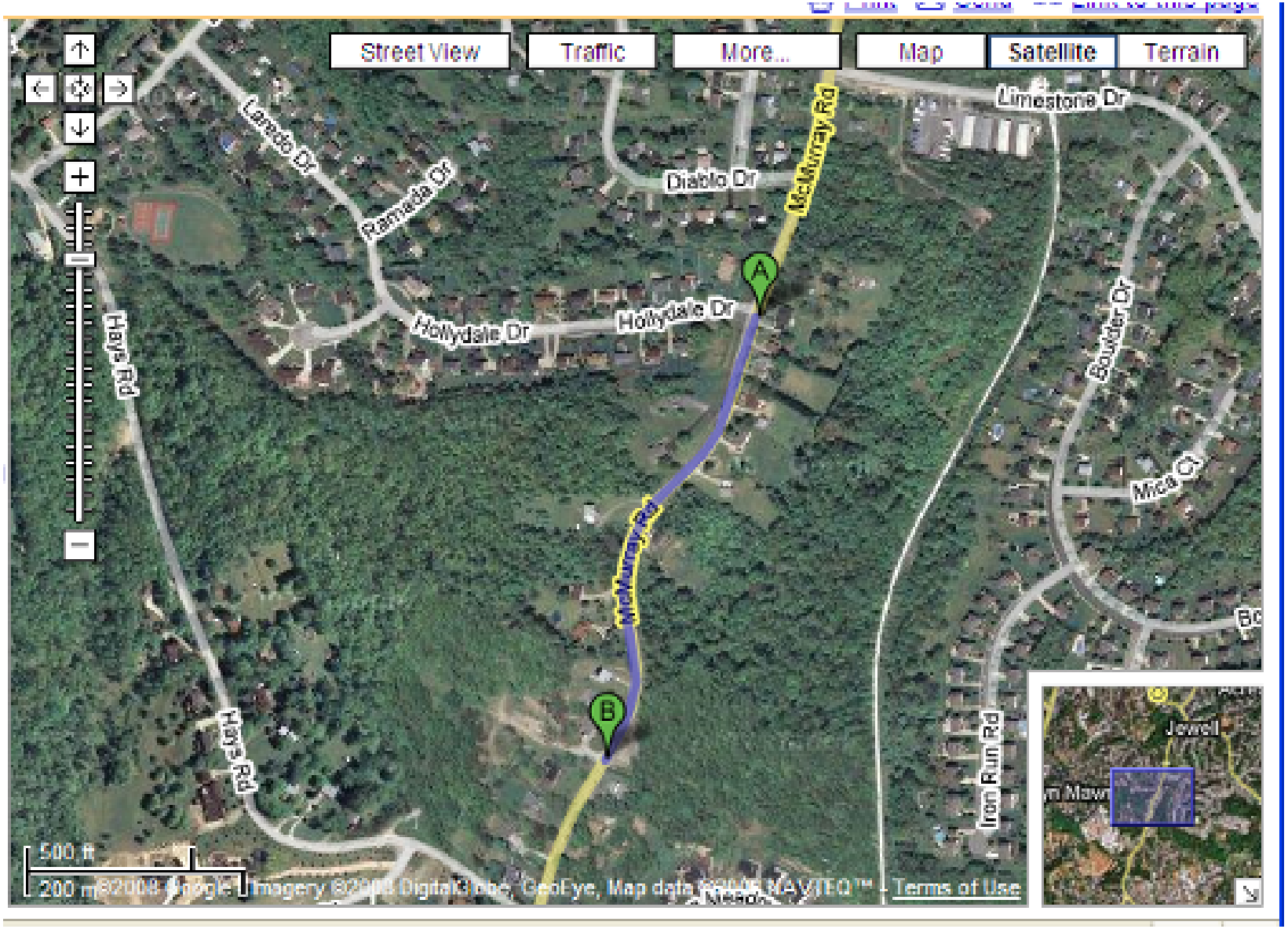


# Grouped by Block and Pipe Type



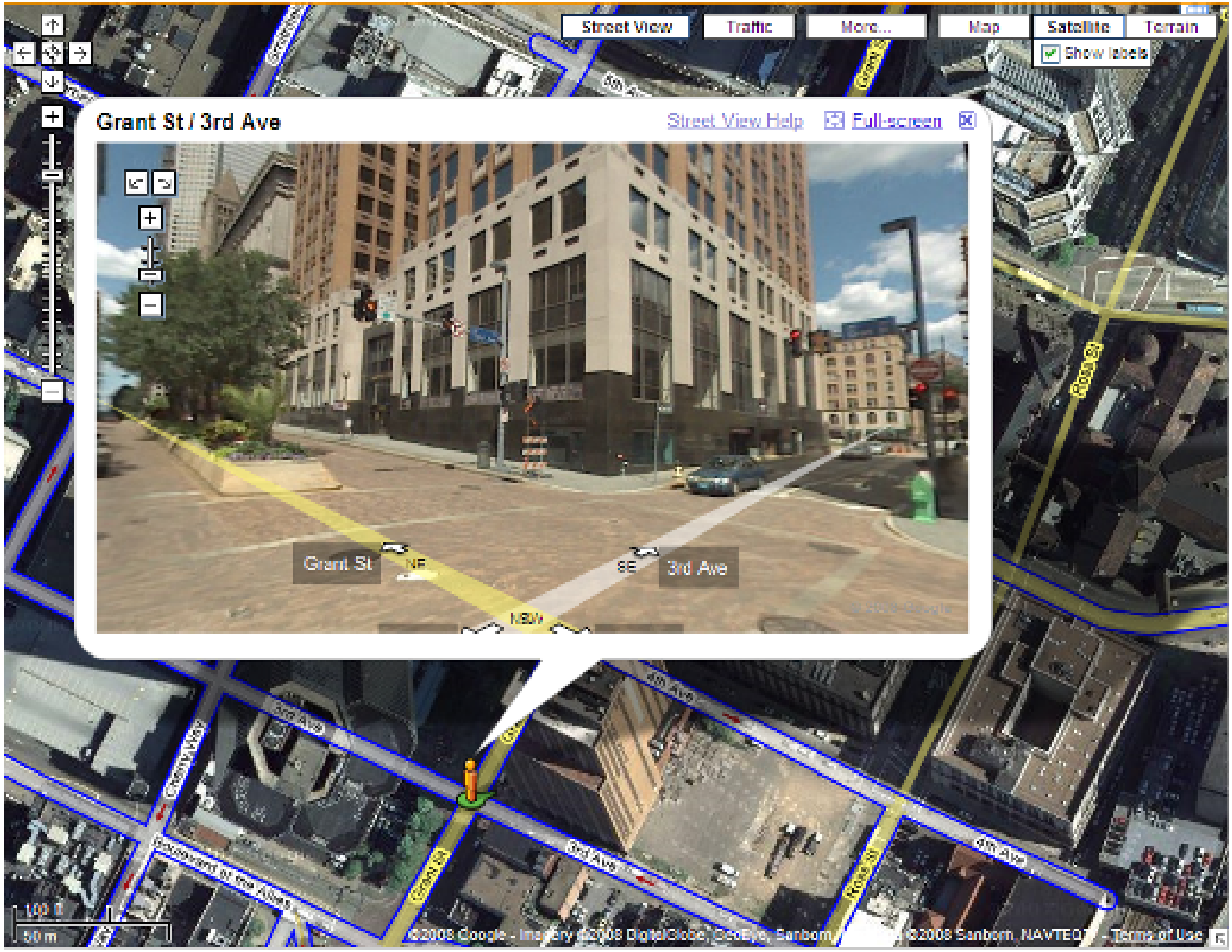
# On the Maps

# View in the (virtual) World



# Is there more risk here?

# Or Here?


Street View
Traffic
More...
Map
Satellite
Terrain
Show labels
Grant St / 3rd Ave
Street View Help
Full-screen
Grant St
NE
SE
3rd Ave
NW
Grant St
3rd Ave
4th Ave
Cherry Alley
Boulevard of the Allies
100 ft
50 m
©2008 Google - Imagery ©2008 DigitalGlobe, GeoEye, Sanborn
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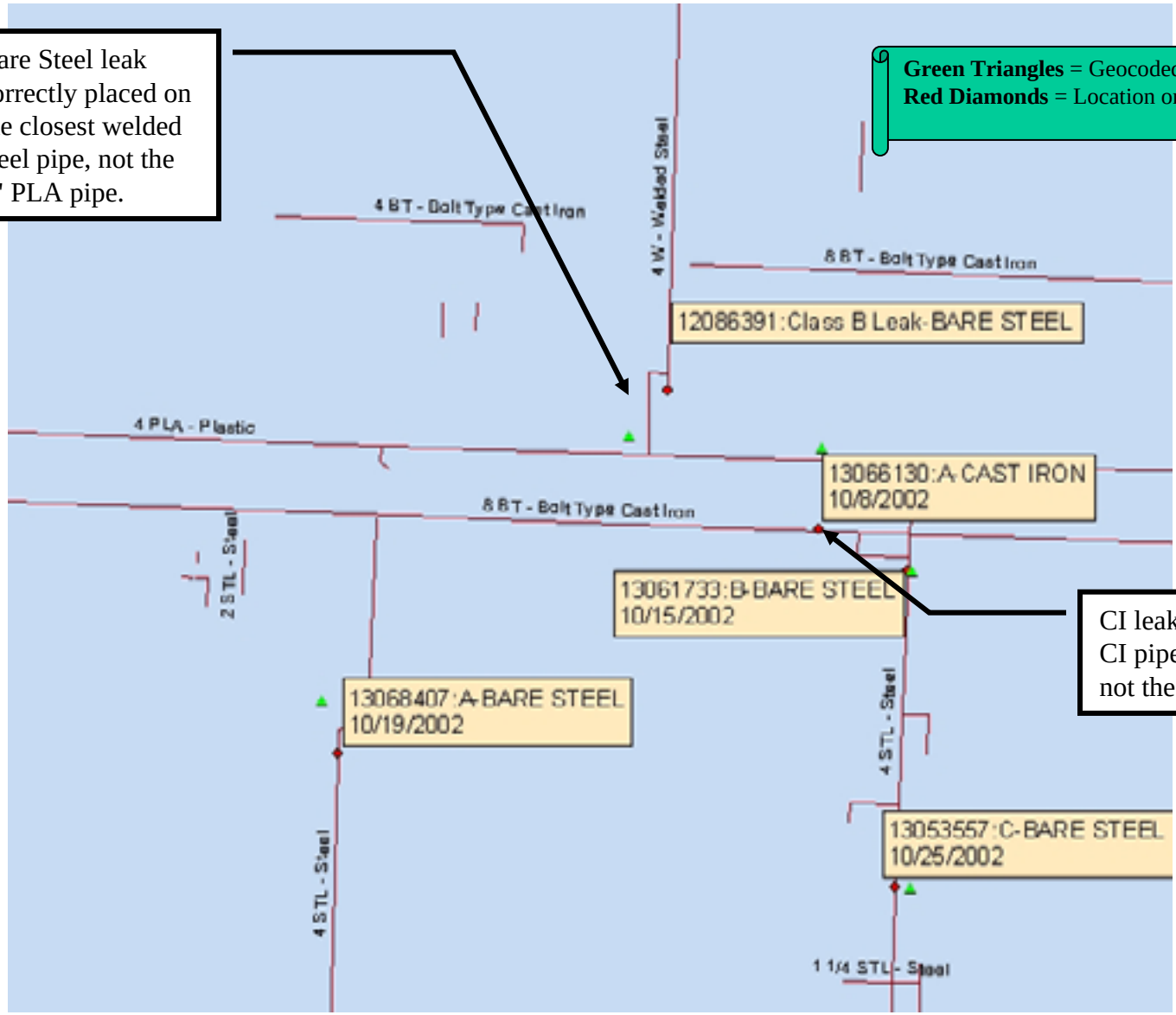
# Should We Map Our Leaks?

- Yes! – establish an on-going process
  - Capture on mobile devices (GPS?)
  - Open Leaks – place on nearest main or service
  - Repairs – adjust location to correct facility
- Legacy Leak Geocoding and Pipe Association
  - Find candidate coordinates for the leak address
  - Find nearby facility that best matches attributes of the leak and leak repair
- Consider Specialized Leak Placement Tools
  - For data entry efficiency and quality control

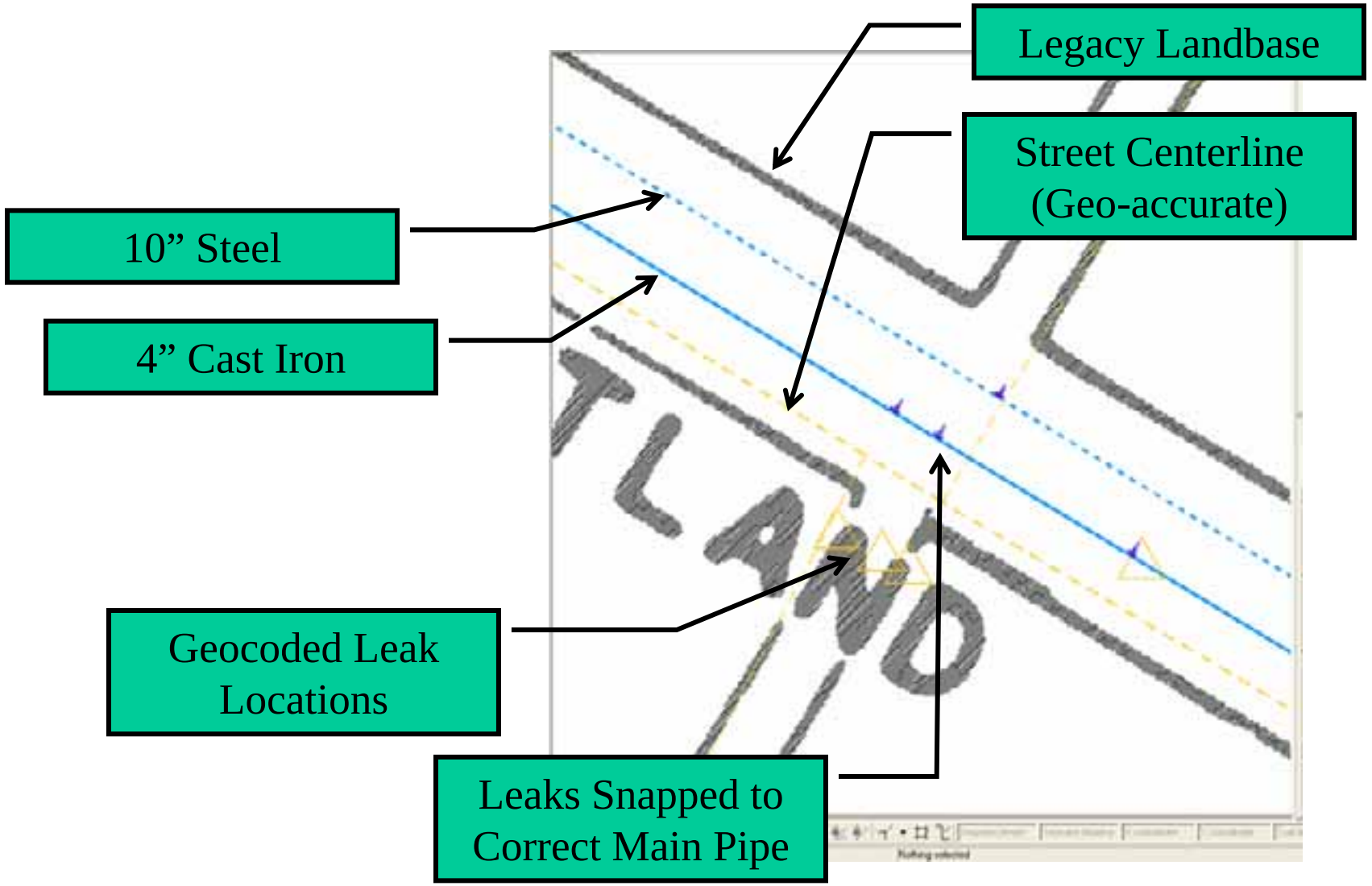
# Leak Geocoding and Pipe Association Process

- Construct candidate addresses
  - Combine street address plus zipcodes (from map grids?)
- Geocode to get candidate locations
- Find candidate facilities
  - Search radius based on legacy landbase accuracy
- Calculate confidence score for each candidate facility
  - Compare repair & inspection attributes with facility attributes
- Select location with highest confidence facility
- Snap leak to closest point on facility
- Save the confidence score for reference!

# Getting Leaks on the Right Facility



# Getting Leaks on the Right Facility



# East Coast Small Utility

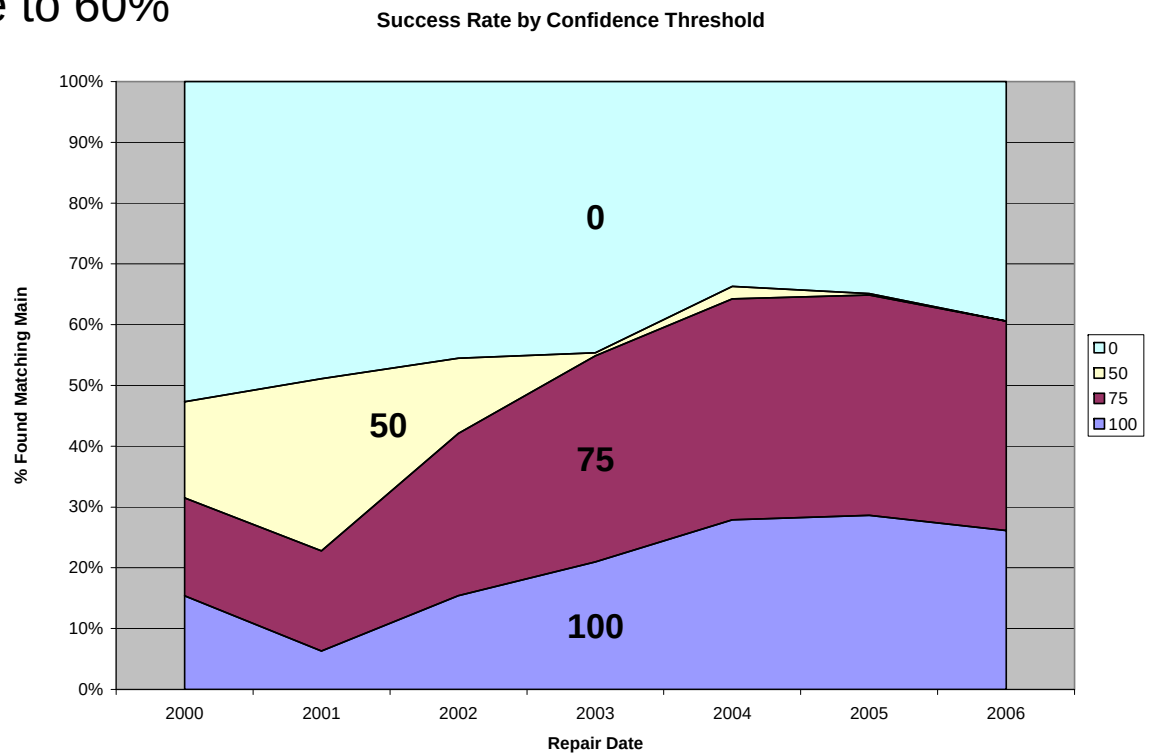
- Data from legacy mainframe system
- Many records with poor quality addresses or incomplete pipe attributes
- 50% confidence or better was deemed good enough to assume a match
- Note many pipes had been replaced and were no longer present in the Smallworld GIS (with no way to determine this from the leak record)

| Description | Count | % of All Main Leaks |
|---|---|---|
| Total Leaks | 32,046 | |
| Main Leaks | 15,336 | 100% |
| Main Leaks Not Geocoded | 1,935 | 13% |
| Main Leaks Geocoded | 13,320 | 87% |

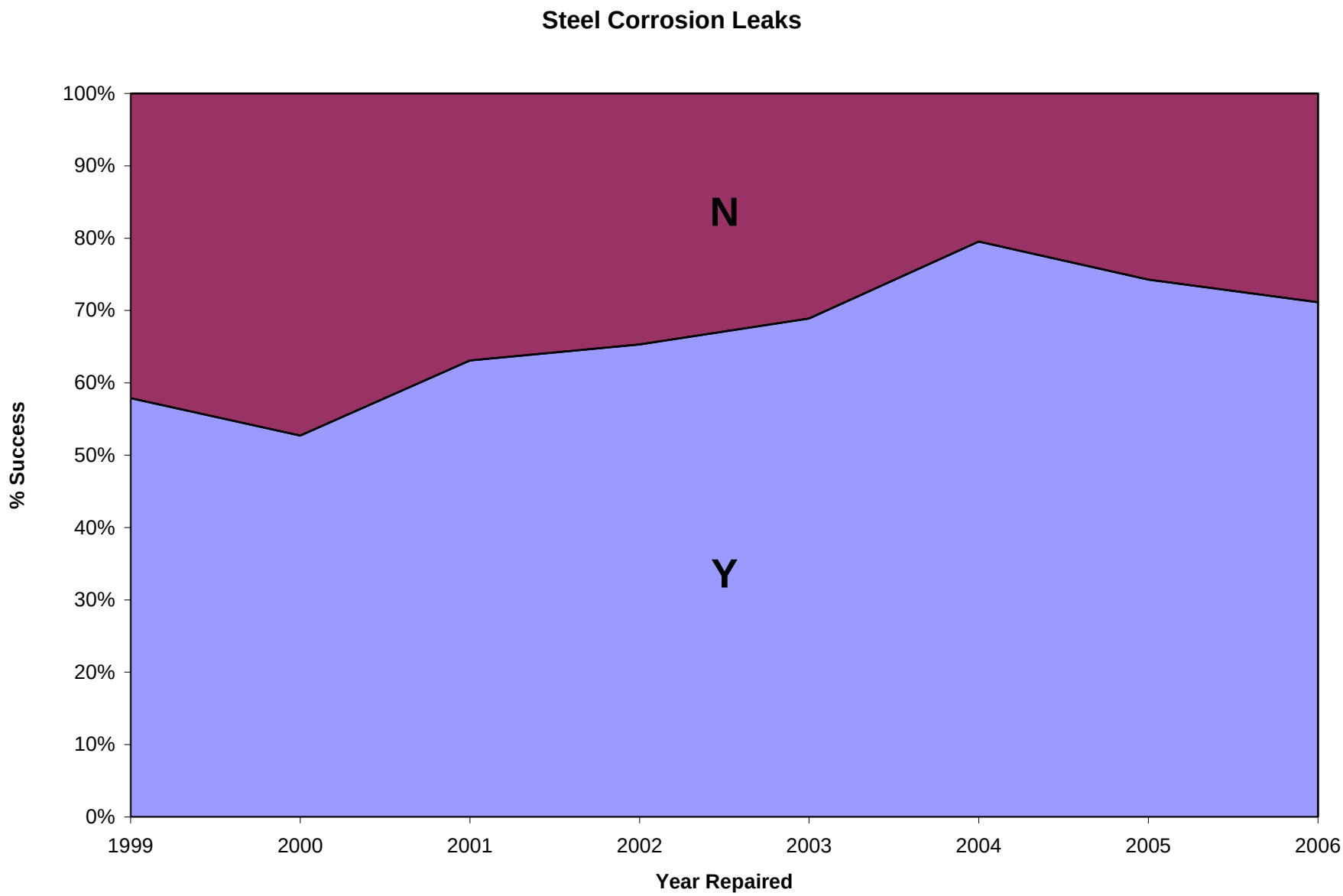
| Description | Count | % of All Main Leaks | % of Geocoded Leaks | Comments |
|---|---|---|---|---|
| No Main Found | 5,245 | 34% | 25% | 3,295 geocoded w/ no main |
| Main Found | 10,093 | 66% | 76% | |
| Main Found w/ Confidence >= 90% | 3,351 | 22% | 25% | |
| Main Found w/ Confidence >= 75% | 6,584 | 43% | 49% | |
| Main Found w/ Confidence >= 60% | 8,570 | 56% | 64% | |
| Main Found w/ Confidence >= 50% | 10,093 | 66% | 76% | |

# Arkansas Results

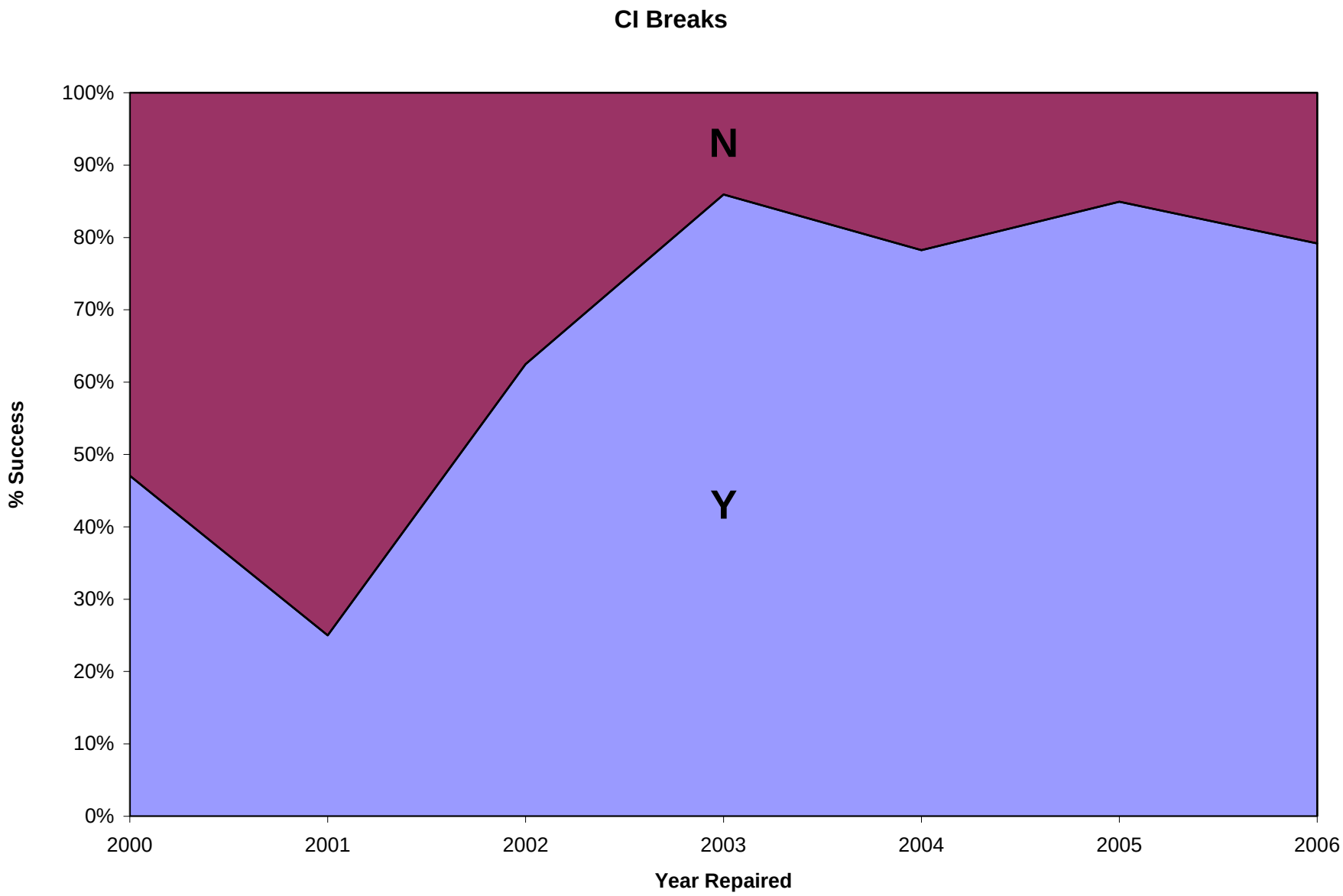
- Leaks from acquired company, single state only
- Attempted to capture at least two 3-year survey cycles
- Improving results for more recent leaks (better data, pipe more likely to still exist in ESRI GIS)
- 17,361 Main Repairs, 11,615 geocoded successfully (67%)
- 9,745 (84%) of those matched to a pipe with confidence > 50%
- Overall success close to 60%



# Steel Corrosion Leaks

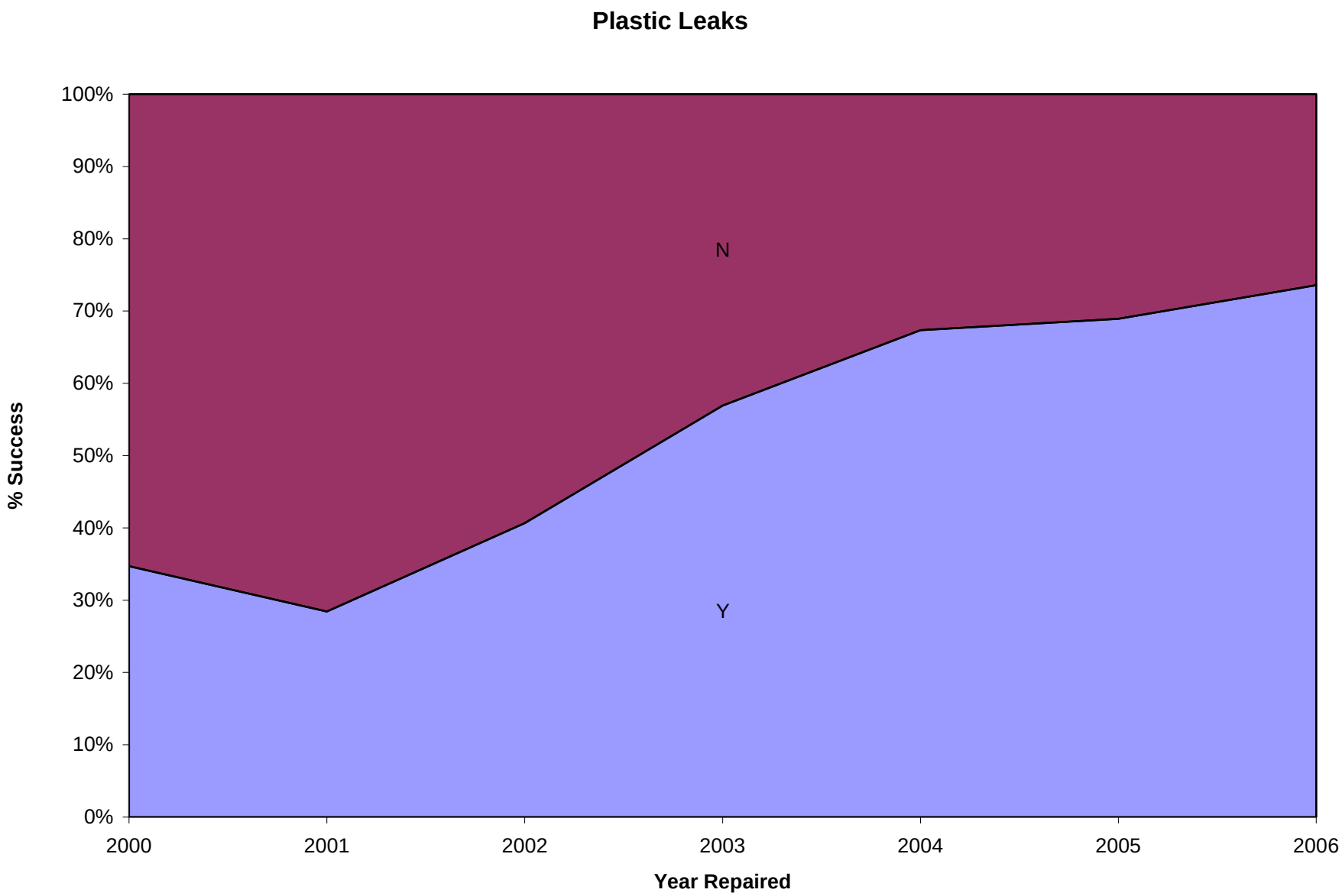


# CI Breaks


CI Breaks
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Success
N
Y
2000
2001
2002
2003
2004
2005
2006
Year Repaired

# CI Joint and Other Leaks

# Plastic Leaks



# Other CenterPoint Energy Plans

- Posting ~60k legacy repairs in TX to GIS
- Scanned repair forms, manual placement using offshore resources
- 80%+ success so far
- Anticipate completion by early next year
- Results will be available to support DIMP plan, risk assessments, and other mapping applications

# Questions?

Or visit Booth 101…