“Enhancing Sustainable Utility Regulation [“ENSURE”]”

PIPELINE SAFETY INSPECTIONS

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Participants: NARUC, OPSI, ECOWAS Regional Electricity Regulation Authority (ERERA), and West African Gas Pipeline Authority (WAGPA).

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Background

- Regulatory authority or oversight of the mode of transportation of natural gas (pipelines) and hazardous materials has been vested in the U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA)
- PHMSA's Office of Pipeline Safety has enforcement authority over the network of pipelines that operate in the US
- By mutual consent, PHMSA authority has been delegated to States including DC for intrastate pipelines
- PHMSA's website is http://www.phmsa.dot.gov/
- DC PSC website if http://www.dcpsc.org

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Gas Pipeline Safety Standards for District of Columbia and States

The federal government's gas safety regulations for transportation of natural and other gas by pipeline, excluding LNG, oil pipeline, and hazardous lights are embodied in:

- 49 Code of Federal Regulations (CFR) 190 (Pipeline Safety Program Procedures);
- 49 CFR 191 (Annual Reports and Incident Reports);
- 49 CFR 192 (Minimum Federal Safety Standards); and
- 49 CFR 199 (Drug and Alcohol Testing).
- DC and other states have adopted the above federal regulations for intrastate natural gas transmission and distribution facilities except to the extent that the regulations of the states are more stringent (DC Municipal Regulations § 15.2301).
- In addition, each State collaborates with regulatory peers and trade and research allies such as NAPSR, NARUC, Mid-Atlantic Conference of Regulatory Utilities Commissioners, NGA, AGA, API, ASME
- Per 49 CFR 192.605 and DCMR 2307.1 each operator shall have on file with the state regulator and keep appropriate parts at work locations:

  (a) An operations, maintenance and emergency manual

  (b) Records of reviews and updates to such a manual at intervals not exceeding 15 months, but at least once/CY

  State reviews the operator's O&M manual for compliance.

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6 Important Areas of DC PSC's Pipeline Safety Regulation

Here are six (6) examples of gas pipeline safety areas regulated under DC (similar to other states) gas pipeline safety rules:

- Corrosion
- Inspection of New Construction/Replacement Jobs
- Leak Management
- Smart Pig
- Valves and Regulating Devices
- Damage Prevention

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Corrosion

- Corrosion is the deterioration of metal pipe.
- Corrosion is caused by a reaction between the metallic pipe and its surroundings.
- As a result, the pipe deteriorates and may eventually leak.
- Although corrosion can not be eliminated, it can be substantially reduced with cathodic protection and other control measures

Corrosion Regulation Criteria

- **49 CFR § § 192.455 & 192.457** provide criteria for monitoring buried or submerged pipelines
- **49 CFR § 192.459** provides criteria for examining exposed pipelines for evidence of corrosion or coating deterioration
- **49 CFR § 192.461** provides requirements for protective coating for external corrosion control
- **49 CFR §192.463** provides criteria for establishing the level of cathodic protection
- **49 CFR §192.465** provides criteria for monitoring external cathodic protection (Once a year, not to exceed 15 months)

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Types of Corrosion

- External Corrosion

External corrosion occurs due to environmental conditions on the outside of the pipe.

- Internal Corrosion

Corrosion on the internal wall of a natural gas pipeline can occur when the pipe wall is exposed to water and contaminants in the gas, such as O_2, H_2S, CO_2, or chlorides.

- Atmospheric Corrosion

Atmospheric corrosion occurs on a steel surface in a thin wet film created by the humidity in the air in combination with impurities.

- Stress Corrosion Cracking (SCC)

Stress corrosion cracking (SCC) is a process involving the initiation of cracks and their propagation, possibly up to complete failure of a component, due to the combined action of tensile mechanical loading and a corrosive medium.

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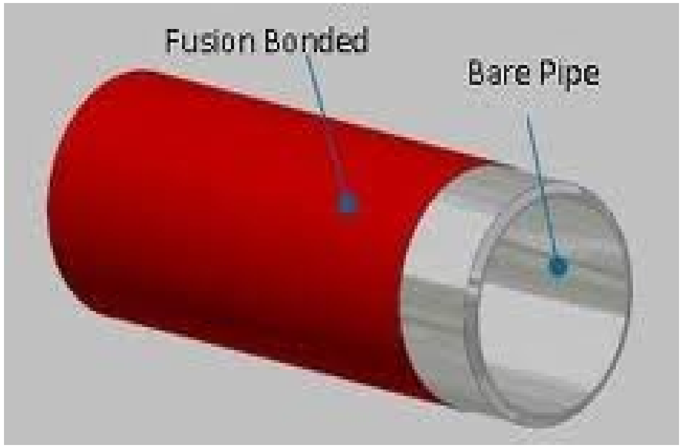
A. Corrosion Control Measures

I. Pipeline Coating

First attempts to control pipeline corrosion relied upon the use of coating materials.

For effective corrosion control, the coating material must :

1. Have an effective electrical insulator;
2. Be applied with no breaks, and remain so during backfilling
3. Constitute an initial perfect film that will remain so with time.



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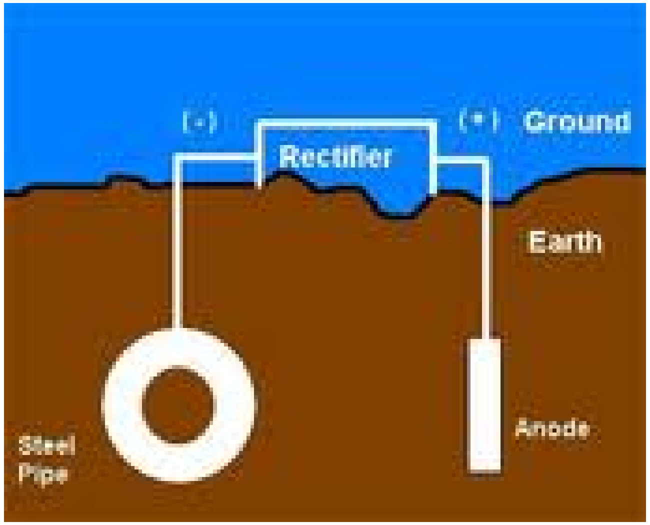
II. Cathodic Protection

All buried metallic pipe installed after July 31, 1971, must be properly coated and have a cathodic protection system designed to protect the pipe in its entirety (49 CFR 192, I)

How it Works:

Cathodic protection is a procedure by which an underground metallic pipe is protected against corrosion. A direct current is impressed onto the pipe by means of a sacrificial anode or a rectifier. Corrosion is reduced where sufficient current flows onto the pipe.



III. Electrical Isolation

A pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and other structures are electrically interconnected and cathodically protected as a single unit (**49 CFR § 192.467)**.

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B. Corrosion Monitoring

I. Test Stations

49 CFR § 192.469:

Each Pipeline under cathodic protection must have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection

II. Test Leads

49 CFR § 192.471:

Each Test Lead wire must be connected to the pipeline

Each test lead wire must have a minimum stress concentration on the pipe

III. Interference Current

49 CFR § 192.473:

Pipeline subjected to stray current shall have a continuing program to minimize the detrimental effects such current

Impressed current type cathodic protection or galvanic anodes systems must be designed and installed with minimum adverse effects on existing underground facilities

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B. Corrosion Monitoring

49 CFR §192.465 External Corrosion Monitoring

Each pipeline that is under cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements. There are some exceptions.

49 CFR §192.477 Internal corrosion MONITORING

If corrosive gas is being transported, coupons or other suitable means must be used to determine the effectiveness of the steps taken to minimize internal corrosion. Each coupon or other means of monitoring internal corrosion must be checked two times each calendar year, but with interval not exceeding 7 1/2 months.

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C. Remedial Measures

Transmission Lines: 49 CFR § 192.485:

a. Corroded segments of transmission lines with wall thickness less than required for MAOP must be replaced or repaired by a reliable engineering method (tests/analyses)
b. Pitted pipe must be replaced or repaired or the operating pressure must be reduced . commensurate with the strength of the pipe, based on remaining wall thickness in the pits.

Distribution Lines: 49 CFR § 192.487:

a. Corroded distribution line with less than 30% remaining wall thickness must be replaced or repaired by a reliable engineering method (tests/analyses).
b. Pitted segment that affects the serviceability of the pipe that may result in leaks must be replaced or repaired.

There are exceptions to the above.

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Inspection of New Construction/Replacement jobs

Our inspections cover the following items:

A. OQ of personnel performing different covered tasks
B. Excavation and facilities protection
C. Plastic Pipe
   - Tracer wire for plastic lines
   - Butt Fusion/Electrofusion (Plastic pipes)
   - Installation of ID tape per codes requirements
D. Steel Pipe
   - Welding

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Institutional Capacity

- Relatively small
- Two Inspectors
- Number of Inspections (85 Inspections days per inspector per year) – PHMSA min. reqt.
- Trainings at Transportation Safety Institute (TSI) Pipeline and Hazardous Materials Safety Administration (PHMSA) in Oklahoma City
- Size of System at End of year 2010 :

Transmission	**Distribution**						
	Miles Mains			# Services			# EFV
	Steel	C/WR. iron	Plastic	Steel	Plastic	Copper	
19.7 miles	412	428	350	26862	84198	11672	11244
TOTAL							
19.7	**1190**			**122732**			**11244**

Note: C = Cast Iron; WR = Wrought Iron; EFV = Excess Flow Valve

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Leak Management - Leak survey Requirements

The following are some of the criteria for the detection, grading and control of natural gas leakage to minimize the associated hazards.

49 CFR§192.723 Distribution systems: Leakage surveys.

a. Periodic leak surveys required of Operator
b. Minimum requirements:
    1. Leakage survey must be conducted in business districts, at intervals not exceeding 15 months, but at least once each calendar year.
    2. A leakage survey must be conducted outside business districts at least once every 5 calendar years at intervals not exceeding 63 months. (for non-cathodically protected distribution lines at least once every 3 calendar years at intervals not exceeding 39 months).

Leak Test Methods

Per 49 CFR 192.706 Leakage Surveys

- Combustible gas indicator (CGI)
- Subsurface gas detector survey (bar hole surveys)
- Bubble leakage test
- Pressure drop test
- Ultrasonic leakage test

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Leak Classification and Repair Times

Each gas leak shall be categorized as Grade 1, 2, or 3 (Level of Risk)

All leaks shall be classified with the following criteria:

- **Grade 1**: A leak that presents an immediate or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous. Shall be promptly repaired, if not repaired immediately upon detection.

  Example: broken line

- **Grade 2**: A leak that is recognized as being non-hazardous at the time of detection, but requires scheduled repair based on probable future hazard. Shall be monitored and reevaluated at least once every six months until cleared with no further signs of leak.

  Example: 10% gas in air above main line

- **Grade 3**: A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous. Shall be monitored and reevaluated during the next scheduled leak survey, or within 15 months of the date reported, whichever occurs first, until the leak is regarded or cleared with no further signs of leak.

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SMART PIG

Pipeline pigs are devices that are inserted into and travel throughout the length of a pipeline driven by a product flow. They were originally developed to remove debris which could block or retard commodity flow through a pipeline. Pigs are used for three main reasons:

- ❑ To batch or separate dissimilar products;
- ❑ For displacement purposes;
- ❑ For internal inspection.

49 CFR 192.150 Passage of Internal Inspection Devices

- ➢ Each new transmission line and each replacement of line pipe, valve, fitting, or other line component in a transmission line must be designed and constructed to accommodate the passage of instrumented internal inspection devices.

- ➢ Except: Manifolds, piping related to compressor , regulator stations, storage facilities.

Case Study: D.C. & Maryland Collaborative Inspections of Transmission Valves

49 CFR §192.745 Valve maintenance: Transmission lines

D.C. and Maryland Joint Compliance Inspection of Transmission Valves

Joint Inspection conducted by the Public Service Commissions of DC and MD to check compliance per section **192.745**

a. Each transmission line valve that might be required during any emergency must be inspected and partially operated at intervals not exceeding 15 months, but at least once each calendar year.

b. Each operator must take prompt remedial action to correct any valve found inoperable, unless the operator designates an alternative valve.

State	Miles of Transmission
DC	19.7
MD	94.56
VA	80.6
Total	194.86

Case Study 1 - D.C. & Maryland Collaborative Inspections of Transmission Valves contd…

Planning/Preparation:

- Identified parties (WGL, DCPSC, MD PSC)
- Scheduled test date: 3/24/2010
- Located Valves: South Chillum
- Reviewed Line Specifications: Installed in 1955; 24 inches diameter Steel with 0.312 wall thickness, MAOP 240 psig
- Notified dispatch and got “go ahead” before operating the valve.

Execution:

- Dispatched Pressure operations personnel to the site
- Installed gauges on both sides to monitor pressure during the test (gauges not required during emergency)
- Recorded pressure indication on all gauges
- Operated valve slowly at 1/8 degree to verify that it works properly and observe gauges and record readings.
- Notified dispatch at the end of inspection.

Recording:

- WGL keeps valves Inspection records for 5 years.
- DC PSC recorded findings in Engineering Form (EN_55)

Duration of inspections:

- Inspection took half a day to complete.

Case Study 2 - Damage Prevention

Purpose:

- Reduce damage caused by excavators to pipelines and other underground facilities. The One-Call notification system helps to reduce excavation damage, or "dig-ins" to these facilities.

Relevance

- Underground facility damage can result in injury and death, as well as severe property damage and loss of vital services and products, electric power, telecommunications, water and sewer, and the flow of natural gas. Accounts for the highest percentage of all pipeline incidents in the US, and in DC.

Rules and Regulation

- **49 CFR Part 192** provides the federal regulations governing underground facilities protection in general. **49 CFR Part 198** outlines the elements of State One-Call Damage Prevention Program and the Qualifications for operation of One-Call notification system. Other requirements include:
  - Each operator of a buried pipeline should carry out a written program to prevent excavation damage to its underground facilities
  - For each buried and above-ground mains and transmission pipeline, a marker be placed and maintained on the pipeline.

811
Know what's below.
Call before you dig.

Case Study 2- Damage Prevention contd…

- **<u>Call Before you Dig</u>**:
  - Most states, including the District, over the years have had a local telephone number to "call before you dig" to mark underground facilities.
  - In 2007 the Federal Communications Commission (FCC) set up 811 as a nationwide toll-free number for underground utility marking to augment and in many states replace the local number.

Case Study 2 - Damage Prevention contd…

- **Damage Prevention Program Enforcement**
  - The Enforcement authority over the Federal Pipeline Safety laws, including One Call, is vested in the US Department of Transportation ("US DOT").
  - US DOT has delegated to the states the responsibility of enforcing the Federal Pipelines Safety laws as expressed in a written Agreement between the states and the US DOT.
  - The Agreement, in part, requires that states develop and implement an underground damage prevention program.
  - Part of the grant funds provided to states by US DOT to implement the federal pipeline safety law is used to perform One Call-related inspections and enforcement.
  - The cost of running the natural gas PSP is shared 50/50 by states and federal. Federal portion in CY 2011 was about $34 million.

Case Study 2- Damage Prevention contd…

Important Provisions of the District One Call Law (Title 34 DC Code § 34.27):

- Facility owners form and operate one call center
- Excavators notification of facility owners 48 hours prior to excavation
- Responsibility of excavator:

  (1)Plan the excavation or demolition to avoid damage to or minimize interference with underground facilities in and near the construction area;

  (2) Maintain a clearance between an underground facility and the cutting edge or point of any mechanized equipment in order to avoid damage to such underground facility; and

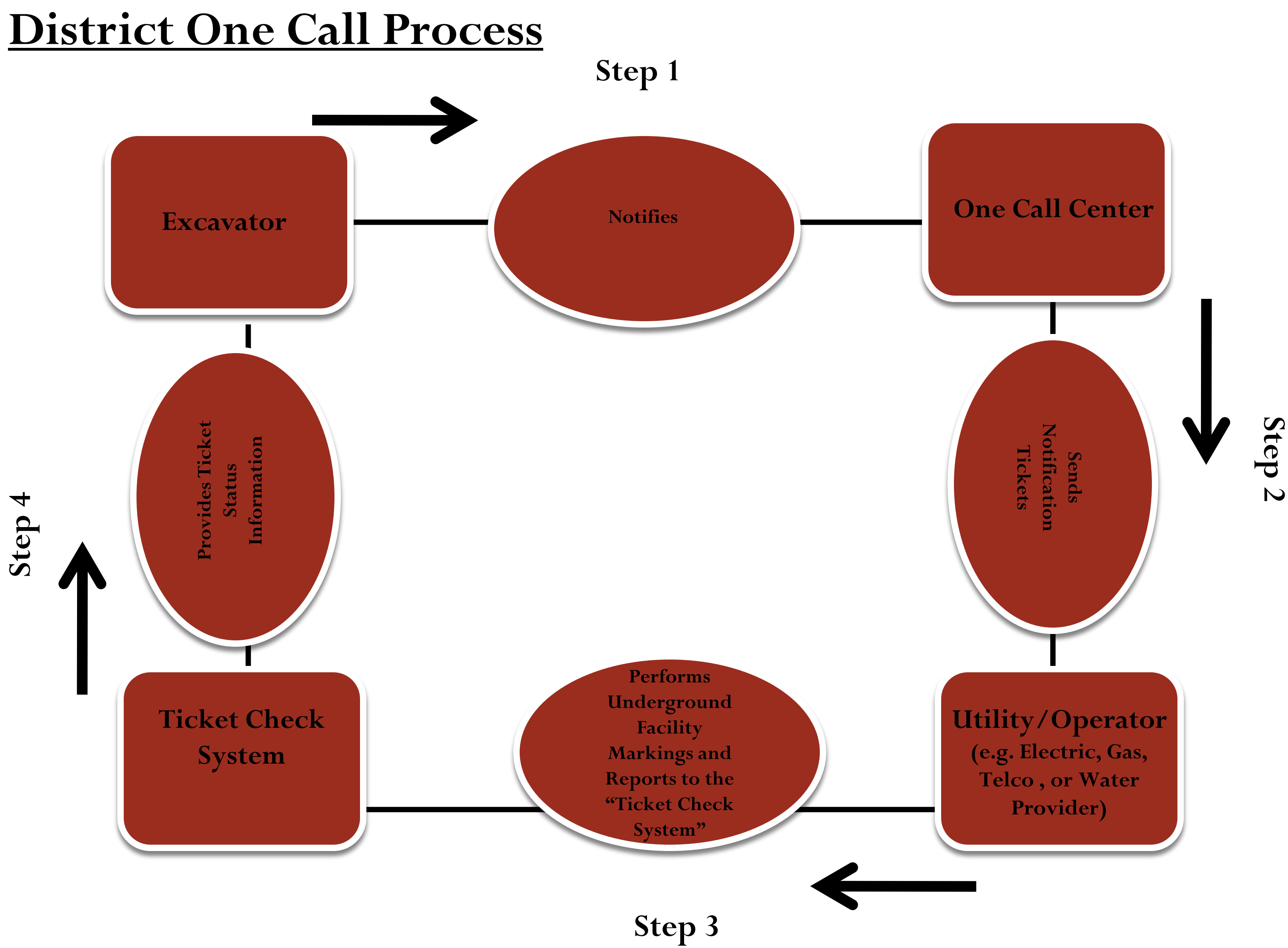
  (3) Provide such support for underground facilities in and near the construction area, including support during backfilling operations, as may be reasonably necessary for the protection of such facilities.
- Notify facility owners of damage caused by excavation
- Liability for damages and civil penalty - For natural gas which DC PSC enforces under 49 CFR 192.614, civil penalty is not to exceed $25,000 for each violation for each day the violation continues, except maximum cannot exceed $1 million for any related series of violations (49 CFR § 190-223)
- Waiver of notification during emergency excavation and demolition

Case Study 2 - Damage Prevention contd…

District One Call Process For Implementing Code Provisions

- There are four (4) major steps in the District One Call process:
  - Step 1: Person(s) wishing to excavate in a particular location must notify the One Call Center of their intentions, at least 48 hours (but no more than 10 days) prior to starting work.
  - Step 2: The One Call center must notify all operators or their contractors who may have facilities in the area of planned excavation, and request that they mark their facilities with the appropriate color code.
  - Step 3: If it is determined by the One Call Center that a proposed excavation or demolition is planned in such proximity to an underground facility, the One Call Center, within 48 hours, notifies (by issuing a ticket) the operator or its contractor to mark, stake, locate, or otherwise provide the approximate location of the operator's underground facilities. At the conclusion of the marking, the operator or its contractor updates the One Call Center's Ticket Check System.
  - Step 4: Excavators access the One Call Center's Ticket Check System to receive ticket status information, including whether the location has been marked or owner shows no facility in the area.

Case Study 2 - Damage Prevention contd…



The End

Thank you!