Raquel J. Webster
Senior Counsel

February 23, 2022

BY ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Docket 5210 - Proposed FY 2023 Gas Infrastructure, Safety and Reliability Plan
Responses to PUC Data Requests – Set 3 (Complete Batch)

Dear Ms. Massaro:

I have enclosed the electronic version of National Grid's[1] responses to the Public Utilities Commission's Third Set of Data Requests in the above-referenced matter.[2]

Thank you for your attention to this matter. If you have any questions, please contact me at 781-472-0531.

Very truly yours,

Raquel J. Webster

Enclosures

cc: Docket 5210 Service List
Leo Wold, Esq.
Al Mancini, Division
John Bell, Division
Rod Walker, Division

[1] The Narragansett Electric Company d/b/a National Grid.

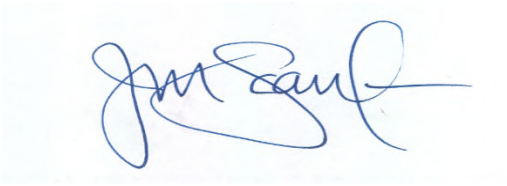
[2] Per a communication from Commission counsel on October 4, 2021, the Company is submitting an electronic version of this filing followed by six (6) hard copies filed with the Clerk within 24 hours of the electronic filing.

40 Sylvan Road, Waltham, MA 02451
T: 781-907-2121 ■ raquel.webster@nationalgrid.com ■ www.nationalgrid.com

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



Joanne M. Scanlon

February 23, 2022
Date

Docket No. 5210 - National Grid's FY 2023 Gas Infrastructure, Safety and Reliability (ISR) Plan - Service List 12/22/2021

Name/Address	E-mail Distribution	Phone
Raquel J. Webster, Esq. **National Grid** 40 Sylvan Road Waltham, MA 02451	raquel.webster@nationalgrid.com; celia.obrien@nationalgrid.com; Joanne.scanlon@nationalgrid.com; Jennifer.Hutchinson@nationalgrid.com;	781-907-2121
National Grid Amy Smith Melissa Little Lee Gresham Ryan Scheib	Amy.smith@nationalgrid.com; Melissa.Little@nationalgrid.com; mei.sun@nationalgrid.com; Theresa.Burns@nationalgrid.com; Michael.Pini@nationalgrid.com; Nathan.Kocon@nationalgrid.com; Ryan.Scheib@nationalgrid.com;	
Division of Public Utilities & Carriers Leo Wold, Esq.	Leo.Wold@dpuc.ri.gov; Margaret.l.hogan@dpuc.ri.gov;	401-780-2130
	Al.mancini@dpuc.ri.gov; John.bell@dpuc.ri.gov; Linda.george@dpuc.ri.gov; Robert.Bailey@dpuc.ri.gov; eullucci@riag.ri.gov; MFolcarelli@riag.ri.gov;	
Rod Walter, CEO/President Rod Walker & Associates	Rwalker@RWalkerConsultancy.com;	706-244-0894
File an original and five copies Luly E. Massaro, Commission Clerk Public Utilities Commission 89 Jefferson Blvd. Warwick RI 02888	Luly.massaro@puc.ri.gov; Patricia.lucarelli@puc.ri.gov; Todd.bianco@puc.ri.gov; Alan.nault@puc.ri.gov;	401-780-2107
PPL Electric Utilities	rjreybitz@pplweb.com;	

Ronald Reybitz Stephen Breininger	skbreininger@pplweb.com;	

PUC 3-1
System Integrity Report/Mains/Services/General

Request:

For all tables and figures in the System Integrity Report (Report) that include a time element or represent a time series, please provide a table that lists the page number and whether the time series refers to calendar years, fiscal years, or some other interval.

Response:

The tables on the System Integrity Report represent data based on calendar year with the exception of the Gross Unaccounted For Gas (LAUF) Table on Bates 129. The LAUF reported percentages is based on the PHMSA reporting requirements for the time period July 1 to June 30 of the reporting year. Please refer to Attachment PUC 3-1 Part G of the instruction for completing Form PHMSA F7100.1-1 Rev. 5/2021.

Prepared by or under the supervision of: Corey Hogg

Instructions (rev 5-2021) for completing Form PHMSA F 7100.1-1 (rev 5-2021)

ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

All section references are to Title 49 of the Code of Federal Regulations. Reporting requirements are contained in Part 191, "Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports and Safety Related Condition Reports." Except as provided in §191.11(b), each operator of a gas distribution pipeline (see definitions below) must submit an annual report Form PHMSA F 7100.1-1 for the preceding calendar year not later than **March 15th**. Be sure to report TOTAL miles of main pipeline and services in the system at the end of the reporting year, including additions to the system during the year. The annual reporting period is on a calendar year basis ending on December 31st of each year.

If you need copies of the Form PHMSA F 7100.1-1 and/or instructions, they can be found on http://www.phmsa.dot.gov/pipeline/library/forms. The documents are included in the section titled Accident/Incident/Annual Reporting Forms.

ONLINE SUBMISSION IS REQUIRED UNLESS AN ALTERNATIVE REPORTING METHOD IS GRANTED BY PHMSA

ALTERNATE REPORTING METHOD

If electronic reporting imposes an undue burden and hardship, an operator may submit a written request for an alternative reporting method to the Information Resources Manager, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, PHP-20, 1200 New Jersey Avenue, SE Washington DC 20590. The request must describe the undue burden and hardship. PHMSA will review the request and may authorize, in writing, an alternative reporting method. An authorization will state the period for which it is valid, which may be indefinite. An operator must contact PHMSA at 202-366-8075, or electronically to informationresourcesmanager@dot.gov or make arrangements for submitting a report that is due after a request for alternative reporting is submitted but before an authorization or denial is received.

ONLINE REPORTING METHOD

Annual Reports must be submitted online through the PHMSA Portal at https://portal.phmsa.dot.gov/portal, unless an alternate method is approved (see Alternate Reporting Methods below).

You will not be able to submit reports until you have met all of the Portal registration requirements – see http://opsweb.phmsa.dot.gov/portal_message/PHMSA_Portal_Registration.pdf
Completing these registration requirements could take several weeks. Plan ahead and register well in advance of the report due date.

Use the following procedure for online reporting:

1. Go to the PHMSA Portal at https://portal.phmsa.dot.gov/portal

2. Enter PHMSA Portal Username and Password ; press *enter*

3. Select OPID; press "*continue"* button.

4. Under "**Create Reports**" on the left side of the screen, under *Annual* select "Gas Distribution" and proceed with entering your data. *Note: Data fields marked with a single asterisk are considered required fields that must be completed before the system will accept your initial submission.* Also, only one annual report by commodity for an OPID may be submitted per year.

5. To save intermediate work without formally submitting it to PHMSA, click **Save**. To modify a draft of an annual report that you saved, go to **Saved Reports** and click on *Gas Distribution*. Locate your saved report by the date, report year, or commodity. Select the record by clicking on it once, and then click **Modify** above the record.

6. Once all sections of the form have been completed, click on **Validate** to ensure all required fields have been completed and data meets all other requirements. A list of errors will be generated that must be fixed prior to submitting an Annual Report.

7. Click **Submit** when you have completed the Report (for either an Initial Report or a Supplemental Report), and are ready to initiate formal submission of your Report to PHMSA.

8. A confirmation message will appear that confirms a record has been successfully submitted. To save or print a copy of your submission, go to **Submitted Reports** on the left hand side, and click on *Gas Distribution*. Locate your submitted report by the date, report year, or Commodity Group, and then click on the PDF icon to either open the file and print it, or save an electronic copy.

9. To submit a *Supplemental Report*, go to **Submitted Reports** on the left hand side, and click on *Gas Distribution*. Locate your submitted report by the date, report year, or Commodity Group. Select the record by clicking on it once, and then click "Create Supplemental".

GENERAL INSTRUCTIONS

The following definitions are from § 192.3:

1. "Distribution line" means a pipeline other than a gathering or transmission line.

2. "Gathering line" means a pipeline that transports gas from a current production facility to a transmission line or main.

3. "Transmission line" means a pipeline, other than a gathering line, that:
   a. Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not downstream from a distribution center;
   b. Operates at a hoop stress of 20 percent or more of SMYS; or

c. Transports gas within a storage field. A large volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas.

4. "Operator" means a person who engages in the transportation of gas.

Make an entry in each block for which data are available. Estimate data if necessary. Avoid entering any data in the **UNKNOWN** columns, if possible. Some companies may have very old pipe for which installation records do not exist. Estimate the total of such mileage in the **UNKNOWN** column of Part B, item 2 "Miles of Main in System at End of Year" and item 3 "Number of Services in System at End of Year", and item 4 "Miles of Main and Number of Services by Decade of Installation."

Do not report miles of pipe, pipe segments, or pipeline in feet. When main miles and service counts for the same set of pipelines is reported in different parts of the form, the online system will require the different parts to be consistent. Main miles and service counts over 60 must be within 0.5% of the baseline and values under 60 must be within 0.3 miles for main and service counts must match exactly. Part B4, decade of installation, will serve as the baseline for main miles and service counts. For example, if you report 60 miles of main in Part B4, the miles of main in Parts B1 and B2 must be within 0.3 miles of 60. For main miles, use the number of decimal places needed to satisfy these consistency checks. Service counts may only be entered as positive integers.

For a given OPID, a separate Annual Report is required for each Commodity Group within that OPID. As an example, if an operator uses a single OPID and has one set of pipeline facilities transporting natural gas and another transporting landfill gas, this operator must file two Annual Reports – one Annual Report covering natural gas facilities and a second for the landfill gas facilities. When a pipeline facility transports two or more Commodity Groups, the pipeline facility should be reported only once under the predominantly transported Commodity Group.

PART A – OPERATOR INFORMATION

1. Name of Operator

This is the company name associated with the OPID. For online entries, the name will be automatically populated based on the OPID entered in A3. If the name that appears is not correct, you need to submit an Operator Name Change (Type A) Notification.

2. Location of Office Where Additional Information May Be Obtained

Enter the appropriate address.

3. Operator's 5-digit Identification Number (OPID)

For online entries, the OPID will automatically populate based on the selection you made when entering the Portal. If you have log-in credentials for multiple OPID, be sure the report is being created for the appropriate OPID. Contact PHMSA's Operator Hotline at 202-366-8075 if you need assistance with an OPID.

4. Headquarters Name and Address

This is the headquarters address associated with the OPID. For online entries, the address will automatically populate based on the OPID entered in A3. If the address that appears is not correct, you need to change it in the online Contacts module.

5. State of Operation

Enter the **State for which information is being reported. Submit a separate report for each State** in which the company operates a gas distribution pipeline system.

6. Commodity Group

It is a PHMSA requirement that operators submit separate Reports for each Commodity Group within a particular OPID.

File a separate Annual Report for each of the following Commodity Group**s**:

Natural Gas

Synthetic Gas (such as manufactured gas based on naphtha)

Hydrogen Gas

Propane Gas

Landfill Gas (includes biogas)

Other Gas – If this Commodity Group is selected, report the name of the other gas in the space provided.

Note: When a pipeline facility transports two or more of the above Commodity Groups, the pipeline facility should be reported only once under the predominantly transported Commodity Group. For example, if an operator has a pipeline segment that is used to transport natural gas during the majority of the year and propane for a couple of weeks, that operator should only file an annual report for the natural gas. If an operator has two pipeline segments with one pipeline segment used to transport natural gas and the other pipeline segment transporting hydrogen gas, that operator should file two annual reports - 1 report for natural gas and 1 report for hydrogen gas.

7. Operator Type

Enter the Type of Operator based on the structure of the company included in this OPID for which this report is being submitted. "Investor Owned" means the operator is controlled by a corporation with publicly traded stock. "Municipally Owned" means the operator is controlled by any type of State or local government entity including, county, parish, utility district, or municipality. "Privately Owned"

means the operator is controlled by a corporation without publicly traded stock. All other operators should report "Cooperative."

PART B – SYSTEM DESCRIPTION

"Coated" means pipe coated with any effective hot or cold applied dielectric coating or wrapper.

"Reconditioned Cast Iron" means cast iron gas distribution pipe that has been lined internally by use of suitable materials that ensure safe operation at an MAOP not to exceed the previously established MAOP. "Reconditioned Cast Iron" does not include cast iron pipe inserted with a gas pipe that is, by itself, suitable for gas service under Part 192, e.g., an ASTM D2513 pipe meeting code requirements for the intended gas service. Such insertions shall be reported as the material used in the insertion. The intent of the definition is to make a clear distinction between a liner and inserted pipe. An example of "Reconditioned Cast Iron" would be the insertion of a liner inside cast iron pipe where the liner relies on the structural integrity of the cast iron pipe. For details on liner insertion, see ASTM F2207, Standard Specification for Cured-in-Place Pipe Lining System for Rehabilitation of Metallic Gas Pipe. Methods of installation like pipe-splitting or bursting that involve the installation of a new stand-alone pipe while the host pipe is destroyed does not result in "Reconditioned Cast Iron".

"PVC" means polyvinyl chloride plastic.

"PE" means polyethylene plastic.

"ABS" means acrylonitrile-butadiene-styrene plastic.

"Cathodically protected" applies to both "bare" and "coated."

"Other" means a pipe of any material not specifically designated on the form. If you enter miles of main or services in the "other" category, describe these materials in the appropriate text box.

"Number of service" is the number of service lines, not the number of customers served.

Provide miles of main and numbers of services by decade installed in Part B, section 4.

If you do not know the decade of installation of the pipe because there are no records containing such information, enter an estimate in the UNKNOWN column. The sum total of mileage and number of services reported for Part B, section 4 must be consistent with total mileage and number of services reported in sections 1, 2, and 3 in Part B.

PART C – TOTAL LEAKS AND HAZARDOUS LEAKS ELIMINATED/REPAIRED DURING YEAR

In the appropriate column, include the total number of leaks and the number of hazardous leaks eliminated by repair, replacement or other action during the reporting year. The number of "hazardous leaks" eliminated or repaired during the year is reported as a performance measure for integrity management per § 192.1007(g). When reporting leaks or hazardous leaks eliminated by replacing or

abandoning a segment of pipe, count the leaks that existed in the pipe segment before it was replaced or abandoned. Also include leaks and hazardous leaks reported on form PHMSA 7100.1, "Incident Report Gas Distribution Systems." A reportable incident is one described in § 191.3. Do not include leaks that occurred during testing.

A "leak" is defined as an unintentional escape of gas from the pipeline. Do NOT report a leak determined to be non-hazardous and eliminated by lubrication, adjustment, or tightening.

A "hazardous leak" means a leak that represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until the conditions are no longer hazardous. A "hazardous leak" which occurs aboveground or belowground is a leak and must be reported.

Operators who do not grade leaks for hazard, but rather repair all leaks when found, need not grade repaired leaks solely for the purpose of this report. Such operators treat all leaks as if hazardous. Operators who do not grade leaks must report the same values for both total and hazardous leaks for each cause.

The "number of known system leaks at the end of the year scheduled for repair" is the total number pipeline system leaks being monitored and scheduled for repair at the end of the calendar year. Monitored leaks also include those leaks which have been temporarily repaired until a permanent repair can be performed. These leaks are non-hazardous unless reclassified following the operator's operation and maintenance procedures.

Enter the number of hazardous leaks by any cause involving a mechanical joint failure during the calendar year. "Mechanical joint" means a connection of two sections of pipe using one of the following types of fittings: stab, nut follower, bolted, or other compression type. The first three types are further described below:

Stab - Internally there are specially designed components including an elastomer seal, such as an "O" ring, and a gripping device to affect pressure sealing and pull-out resistance capabilities. Self-contained stiffeners are included in this type of fitting. With this style fitting the operator would have to prepare the pipe ends, mark the stab depth on the pipe, and "stab" the pipe in to the depth prescribed for the fitting being used.

Nut Follower – The components are generally a body; a threaded compression nut or a follower; an elastomer seal ring; a stiffener or an integrated stiffener for plastic pipe; and, with some, a gripping ring. Normally the design concept of this type of fitting typically includes an elastomer seal in the assembly. The seal, when compressed by tightening of a threaded compression nut grips the outside of the pipe, affecting a pressure-tight seal and, in some designs, providing pull-out resistance. For plastic pipe, the inside of the pipe wall should be supported by the stiffener under the seal ring and under the gripping ring (if incorporated in the design), to prevent collapse of the pipe. A lack of this support could result in a loss of the seal affected by the seal ring or the gripping of the pipe for pull-out resistance. This fitting style is normally used in pipelines 2-inches in diameter and smaller. There are two categories of this type of joining device manufactured. One type is provides a seal only, and the other provides a seal plus pipe restraint against pull-out.

Bolted – The bolt type mechanical fitting has similar components as the nut follower except instead of a threaded compression nut or follower, there is a bolt arrangement. This fitting style is most often used in pipelines 2-inches in diameter and larger.

Leak causes are classified as:

CORROSION FAILURE: leak caused by galvanic, atmospheric, stray current, microbiological, or other corrosive action. A corrosion release or failure is not limited to a hole in the pipe or other piece of equipment. If the bonnet or packing gland on a valve or flange on piping deteriorates or becomes loose and leaks due to corrosion and failure of bolts, it is classified as Corrosion. (Note: If the bonnet, packing, or other gasket has deteriorated to failure, whether before or after the end of its expected life, but not due to corrosive action, report it under a different cause category, such as G4 Incorrect Operation for improper installation or G6 Equipment Failure if the gasket failed)

NATURAL FORCE DAMAGE: leak caused by outside forces attributable to causes NOT involving humans, such as earth movement, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperature, thermal stress, frozen components, high winds (Including damage caused by impact from objects blown by wind), or other similar natural causes. Lightning includes both damage and/or fire caused by a direct lighting strike and damage and/or fire as a secondary effect from a lightning strike in the area. An example of such a secondary effect would be a forest fire started by lightning that results in damage to a gas distribution system asset which results in an incident.

EXCAVATION DAMAGE: leak resulting directly from excavation damage by operator's personnel (oftentimes referred to as "first party" excavation damage) or by the operator's contractor (oftentimes referred to as "second party" excavation damage) or by people or contractors not associated with the operator (oftentimes referred to as "third party" excavation damage). Also, this section includes a release or failure determined to have resulted from previous damage due to excavation activity. For damage from outside forces OTHER than excavation which results in a release, use Natural Force Damage or Other Outside Force, as appropriate.

OTHER OUTSIDE FORCE DAMAGE: leak resulting from outside force damage, other than excavation damage or natural forces such as:

- Nearby Industrial, Man-made or Other Fire/Explosion as Primary Cause of Incident (unless the fire was caused by natural forces, in which case the leak should be classified Natural Forces. Forest fires that are caused by human activity and result in a release should be reported as Other Outside Force),
- Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation. Other motorized vehicles/equipment includes tractors, mowers, backhoes, bulldozers and other tracked vehicles, and heavy equipment that can move. Leaks resulting from vehicular traffic loading or other contact (except report as "Excavation Damage" if the activity involved digging, drilling, boring, grading, cultivation or similar activities.
- Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels so long as those activities are not excavation activities. If those activities are excavation activities such as dredging or bank stabilization or renewal, the leak repair should be reported as "Excavation Damage".
- Previous Mechanical Damage NOT Related to Excavation. A leak caused by damage that occurred at some time prior to the release that was apparently NOT related to excavation activities, and would

include prior outside force damage of an unknown nature, prior natural force damage, prior damage from other outside forces, and any other previous mechanical damage other than that which was apparently related to prior excavation. Leaks resulting from previous damage sustained during construction, installation, or fabrication of the pipe, weld, or joint from which the release eventually occurred are to be reported under "Pipe, Weld, or Joint Failure". Leaks resulting from previous damage sustained as a result of excavation activities should be reported under "Excavation Damage" unless due to corrosion in which case it should be reported as a corrosion leak.

- Intentional Damage/. Vandalism means willful or malicious destruction of the operator's pipeline facility or equipment. This category would include pranks, systematic damage inflicted to harass the operator, motor vehicle damage that was inflicted intentionally, and a variety of other intentional acts.
- Terrorism, per 28 C.F.R. § 0.85 General functions, includes the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.
- Theft. Theft means damage by any individual or entity, by any mechanism, specifically to steal, or attempt to steal, the transported gas or pipeline equipment.

PIPE, WELD, OR JOINT FAILURE : Leak resulting from a material defect within the pipe, component or joint due to faulty manufacturing procedures, desing defects, or in-service stresses such as vibration, fatigue and environmental cracking. Material defect means an inherent flaw in the material or weld that occurred in the manufacture or at a point prior to construction, fabrication or installation. Design defect means an aspect inherent in a component to which a subsequent failure has been attributed that is not associated with errors in installation, i.e., is not a construction defect. This could include, for example, errors in engineering design. Fitting means a device, usually metal, for joining lengths of pipe into various piping systems. It includes couplings, ells, tees, crosses, reducers, unions, caps and plugs. Any leak that is associated with a component or process that joins pipe such as threaded connections, flanges, mechanical couplings, welds, and pipe fusions that leak as a result from poor construction should be classified as "Incorrect Operation". Leaks resulting from failure of original sound material from force applied during construction that caused a dent, gouge, excessive stress, or other defect, including leaks due to faulty wrinkle bends, faulty field welds, and damage sustained in transportation to the construction or fabrication site that eventually resulted in a leak, should be reported as "Pipe, Weld or Joint Failure".

EQUIPMENT FAILURE: leak caused by malfunctions of control and relief equipment including regulators, valves, meters, compressors, or other instrumentation or functional equipment, Failures may be from threaded components, Flanges, collars, couplings and broken or cracked components, or from O- Ring failures, Gasket failures, seal failures, and failures in packing or similar leaks. Leaks caused by overpressurization resulting from malfunction of control or alarm device; relief valve malfunction: and valves failing to open or close on command; or valves which opened or closed when not commanded to do so. If overpressurization or some other aspect of this incident was caused by incorrect operation, the incident should be reported under "Incorrect Operation."

INCORRECT OPERATION: leak resulting from inadequate procedures or safety practices, or failure to follow correct procedures, or other operator error. It includes leaks due to improper valve selection or operation, inadvertent overpressurization, or improper selection or installation of equipment. It includes a leak resulting from the unintentional ignition of the transported gas during a welding or maintenance activity.

OTHER CAUSE: leak resulting from any other cause not attributable to the above causes. A best effort should be made to assign a specific leak cause before choosing the Other cause category. An operator replacing a bare steel pipeline with a history of external corrosion leaks without visual observation of the actual leak, may form a hypothesis based on available information that the leak was caused by external corrosion and assign the Corrosion cause category to the leak.

PART D – EXCAVATION DAMAGE

Excavation damages are reported as a measure of the effectiveness of integrity management programs (§ 192.1007(g)).

Report the "Number of Excavation Damages" experienced during the calendar year by the following apparent root cause which are classified as:

One-Call Notification Practices Not Sufficient: Damages resulting from no notification made to the One-Call Center; or notification to one-call center made, but not sufficient; or wrong information provided to One Call Center.

Locating Practices Not Sufficient: Damages resulting from facility could not be found or located; or facility marking or location not sufficient; or facility was not located or marked; or incorrect facility records/maps.

Excavation Practices Not Sufficient: Damages resulting from failure to maintain marks; or failure to support exposed facilities; or failure to use hand tools where required; or failure to test-hole (pot-hole); or improper backfilling practices; or failure to maintain clearance; or other insufficient excavation practices.

Other: Damages resulting from One-Call Center error; or abandoned facility; or deteriorated facility; or previous damage or data not collected; or other.

The Total Number of Excavation Damages will be calculated automatically based on the data entered. For this purpose, "Excavation Damage" means any impact that results in the need to repair or replace an underground facility due to a weakening, or the partial or complete destruction, of the facility, including, but not limited to, the protective coating, plastic pipe tracer wire, lateral support, cathodic protection or the housing for the line device or facility.

Report also the "Number of Excavation Tickets" received during the year, (i.e., receipt of information by the operator from the notification center).

PART E – EXCESS FLOW VALVE (EFV) AND SERVICE VALVE DATA

Report the number of EFV and manual service line shut-off valves installed during the calendar year. Report the estimated total number of EFV and manual service line shut-off valves in the system at the end of the calendar reporting year. Be sure to include the number installed during the calendar year when reporting the estimated number in the system at the end of the calendar year.

PART F – TOTAL NUMBER OF LEAKS ON FEDERAL LAND REPAIRED/ELIMINATED OR SCHEDULED FOR REPAIR

Federal Lands: As defined in 30 U.S.C. §185, federal lands means "all lands owned by the United States except lands in the National Park System, lands held in trust for an Indian or Indian tribe, and lands on the Outer Continental Shelf." Indicate only those leaks repaired, eliminated, or scheduled for repair during the reporting year, including those incidents reported on Form PHMSA F 7100.1.

PART G – PERCENT OF UNACCOUNTED FOR GAS

"Unaccounted for gas" is gas lost; that is, gas that the operator cannot account for as usage or through appropriate adjustment. Adjustments are appropriately made for such factors as variations in temperature, pressure, meter-reading cycles, or heat content; calculable losses from construction, purging, line breaks, etc., where specific data are available to allow reasonable calculation or estimate; or other similar factors.

State the amount of unaccounted for gas as a percent of total consumption for the 12 months ending June 30 of the reporting year.

[(Purchased gas + produced gas) minus (customer use + company use + appropriate adjustments)] divided by (customer use + company use + appropriate adjustments) times 100 equals percent unaccounted for.

PART H – ADDITIONAL INFORMATION

Include any additional information which will assist in clarifying or classifying the reported data.

PART I - PREPARER

PREPARER is the name of the person most knowledgeable about the report or the person to be contacted for more information. Please include the direct phone number and email address as applicable (e-mail address is desired but not required). It should be noted that PHMSA will use your e-mail address to issue correspondence that is normally sent via mass mailings. "Correspondence" includes notifications such as the annual reminder letter for Annual Report filings.

PUC 3-2
System Integrity Report/Mains/Services/General

Request:

For each of the following, please provide a brief definition and how a unit of such is recorded in the dataset used to create the Report:

a. leak receipt;
b. leak backlog;
c. leak repair
d. workable leak backlog
e. main break
f. corrosion leak

Response:

a. A leak receipt is a discovered leak. The unit for leak receipts is each discovered leak.
b. The leak backlog is the summation of all of the existing leak receipts yet to be repaired. The unit for leak backlog is each discovered leak.
c. A leak repair is the repair of a discovered leak. The unit for leak repairs is each repaired leak.
d. The workable leak back log is all active Type 1, Type 2A, and Type 2 leaks. The unit for workable leak backlog is each active leak (Type 1, Type 2A, or Type 2).
e. A main break is a leak which was reported as being caused by a cracking of a main. The unit for main break is each leak with an attributed cause of "main break".
f. A corrosion leak is a leak which was reported as being caused by corrosion of a main. The unit for corrosion is each leak with an attributed cause of "corrosion."

Prepared by or under the supervision of: Corey Hogg

PUC 3-3
System Integrity Report/Mains/Services/General

Request:

On Bates 76, the Report states "Distribution Engineering… finds that RI has experienced only slight increases in the amount of leak receipts despite an elevated number of Heating Degree Days…" What period does this statement refer to? If the answer is the 2019 to 2020 period, please reconcile the statement with the data presented in the Report.

Response:

The table on Bates 76 refers to the change in percentage between the 2019 vs. 2020 data. Please refer to the table below for the 2019 and 2020 data corresponding to the percent change on the above referenced table:

PERCENT CHANGE 2019 to 2020	2020	2019	% Change
HDD	1,104	1,424	-22.5%
Leak Receipts	1,738	2,107	-17.5%
Workable Leak Backlog	155	164	-5.5%
LPP Main Inventory	989	1,052	-5.9%
LPP Service Inventory	45,184	46,203	-2.2%
Overall Main Leak Rate	0.23	0.31	-24.4%
Cast Iron Main Break Rate	0.02	0.09	-74.3%
Steel Main Corrosion Leak Rate	0.10	0.09	4.3%
Service Leak Rate	2.26	2.79	-19.1%

Prepared by or under the supervision of: Corey Hogg

PUC 3-4
System Integrity Report/Mains/Services/General

Request:

Regarding the data in the table on Bates 78, using the definitions of leak receipt, backlog, and repair, please explain why the 2019 backlog, less the 2020 repairs, plus the 2020 receipts is not equal to the 2020 backlog.

Response:

The annual leak backlog number shown for each year in the table on Bates 78 is captured at a point in time. However, subsequent to publishing each year's System Integrity Report leak backlog number, the Company may repair leaks found in one year in the next year, remove leaks that were eliminated by main replacement, eliminate duplicate leaks, or otherwise update data for prior years. The Company does not revise the prior year's leak backlog data in the System Integrity Report. Therefore, the calculation above will not produce the result described in this request.

Prepared by or under the supervision of: Corey Hogg

PUC 3-5
System Integrity Report/Mains/Services/General

Request:

Please provide the figure and table on Bates 87 but broken out into two pages: one for mains and one for services.

Response:

The Company is not able to determine the facility type (e.g., main or service) until the leak is pinpointed and the facility is exposed.

PUC 3-6
System Integrity Report/Mains/Services/General

Request:

What is the "Work Continuation Plan" noted on Bates 90?

Response:

The note regarding the "Work Continuation Plan" was included in error and does not apply to Rhode Island.

PUC 3-7
System Integrity Report/Mains/Services/General

Request:

Please report the data or plot the figures shown on Bates 89 through 91 broken out by material type.

Response:

Graph on Bates 89, Leak Repair by Type:

- Please refer to Bates 101 for main leak repairs by material and Bates 121 for service leaks repaired by material.

Graph on Bates 90, Workable Leak Backlog, and Graph on Bates 91, Open Type 3 Leak Backlog:

- The Company is not able to determine the facility type (e.g., main or service) and facility material until the leak is pinpointed and the facility is exposed.

PUC 3-8
System Integrity Report/Mains/Services/General

Request:

Please recreate all figures and tables in Section 7 of the Report (beginning on Bates 97) but replace the data of leak repairs (as shown) with data of leak receipts, including in the defining equation for "Main Leak Rate" shown on Bates 103.

Response:

The Company is not able to recreate the graphs in Section 7 substituting leak receipt information in place of leak repair information because the facility type (e.g., main or service), leak material type, leak cause, leak rate is not known until the leak is pinpointed, the facility is exposed and repaired. Please refer to Bates 79 for Leak Receipt Rate for mains and services combined.

PUC 3-9
System Integrity Report/Mains/Services/General

Request:

On a single plot, please show the main leak receipts per mile of leak prone pipe and the cast iron leak receipts per mile of cast iron main for the years 2011 through 2020. Please include the data in a table as in the format of Bates 103. Looking at the data reported, does the data support, contradict, or have no relationship to whether National Grid's procedure ENG04030 tends to prioritize the leakiest pipes first for replacement?

Response:

The Company is not able to determine the facility type (e.g., main or service) and facility material until the leak is pinpointed and the facility is exposed. Please refer to Bates page 79 for the leak receipts per miles of mains for the entire Rhode Island distribution system.

Based on the leak rate graph on Bates 103, the leak rate on the entire distribution system has been reduced by 57%, which is a testimony that the riskiest segments are being prioritized for replacement.

Prepared by or under the supervision of: Corey Hogg

PUC 3-10
System Integrity Report/Mains/Services/General

Request:

Regarding the data on Bates 104, does National Grid have an explanation for why there is a downward trend in leak repairs per mile of main in all material types except cast iron and ductile iron?

Response:

Ductile Iron Mains:

Given the small inventory of ductile iron main (13 miles), even a small increase in then number of leaks receipts year over year will appear as a large leak rate increase per the calculation. Given that ductile main leaks are only 2% of all main leaks for 2020, the increase in the leak rate for ductile main is not significant in terms of the actual number of leaks experienced.

Cast Iron Mains:

Cast iron main leak rates will vary more year over than steel leak rates due to multiple factors that influence increased leak activities on cast iron mains on any given year. Some of these factors are:

1. Cold weather is a one of the main causes of cast iron main breaks. Cast Iron tends to break at a higher rate during froze/heave season due to the brittleness of the material.

2. Expansion and contraction that may occur during cold and warm weather.

3. Soil disturbance due to third party excavation in the vicinity of the cast iron mains may cause the cast iron to break and joints to leak.

PUC 3-11
System Integrity Report/Mains/Services/General

Request:

Does National Grid have a goal or target (for planning purposes or any other purpose) for backlogs?

Response:

The Company creates an internal weekly backlog goal for open workable leaks with the goal of minimizing open leaks at the end of the calendar year. The backlog is expected to rise in the early part of each calendar year due to the higher number of leaks reported during the winter, combined with the inability to work many leaks during the municipality road opening moratorium period. The end of year goal for CY2021 was 100.

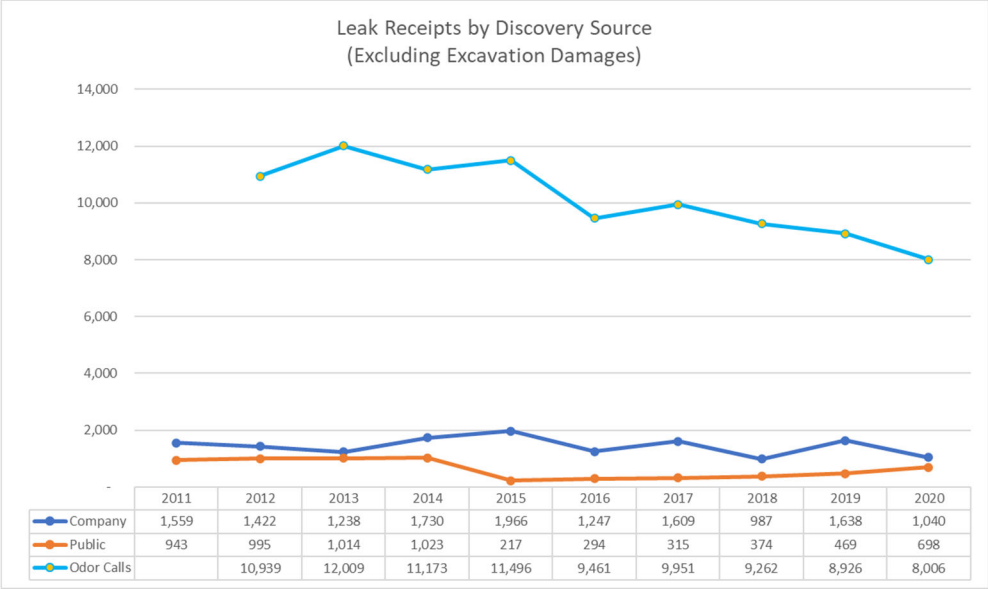
PUC 3-12
System Integrity Report/Mains/Services/General

Request:

How many customer calls, or whatever similar data National Grid maintains, led to the leak receipts discovered through public contact reported on Bates 86?

Response:

Please refer to the graph below, which contains the odor calls and the leaks discovered as result of the odor calls from the public.



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Company	1,559	1,422	1,238	1,730	1,966	1,247	1,609	987	1,638	1,040
Public	943	995	1,014	1,023	217	294	315	374	469	698
Odor Calls		10,939	12,009	11,173	11,496	9,461	9,951	9,262	8,926	8,006

Prepared by or under the supervision of: Corey Hogg

PUC 3-13
System Integrity Report/Mains/Services/General

Request:

Please resubmit the graph on Bates 86 by leak type using warm colors for company-identified leaks and cool colors for public-identified leaks.

Response:

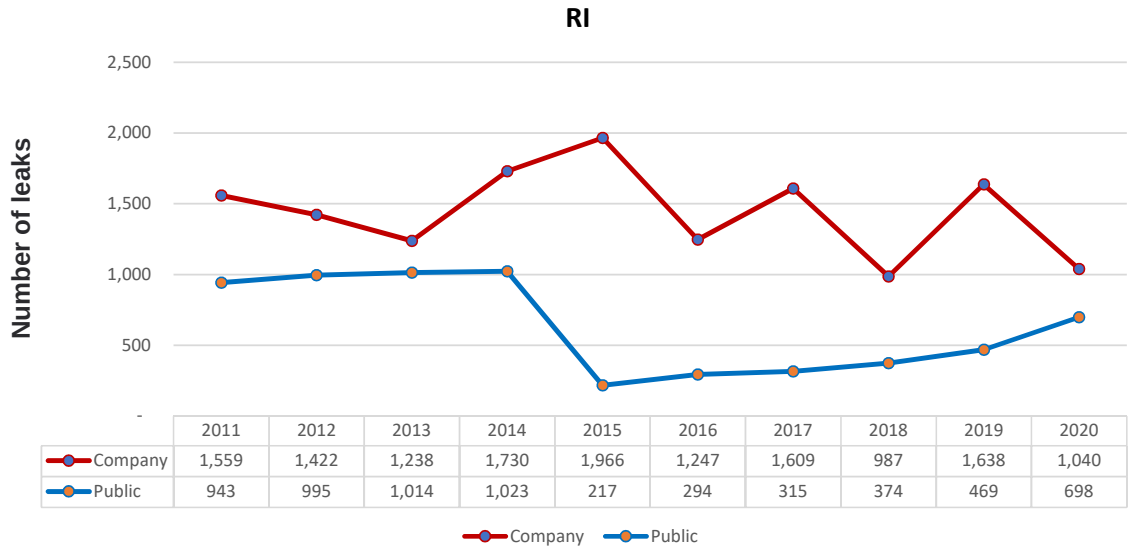
Please refer to Attachment PUC 3-13 for the graph on Bates 86 by leak type using warm colors for company-identified leaks and cool colors for public-identified leaks.

Prepared by or under the supervision of: Corey Hogg

Leak Receipts By Discovery Source

(Excluding Excavation Damages)

RI



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Company	1,559	1,422	1,238	1,730	1,966	1,247	1,609	987	1,638	1,040
Public	943	995	1,014	1,023	217	294	315	374	469	698

PUC 3-14
System Integrity Report/Mains/Services/General

Request:

Please update the graph and table of main inventory of LPP trend on Bates 93 using the forecast information on Bates 134. In the same graph and table, please add a line that uses a forecast based on a budget level with the proposed FY23 Plan.

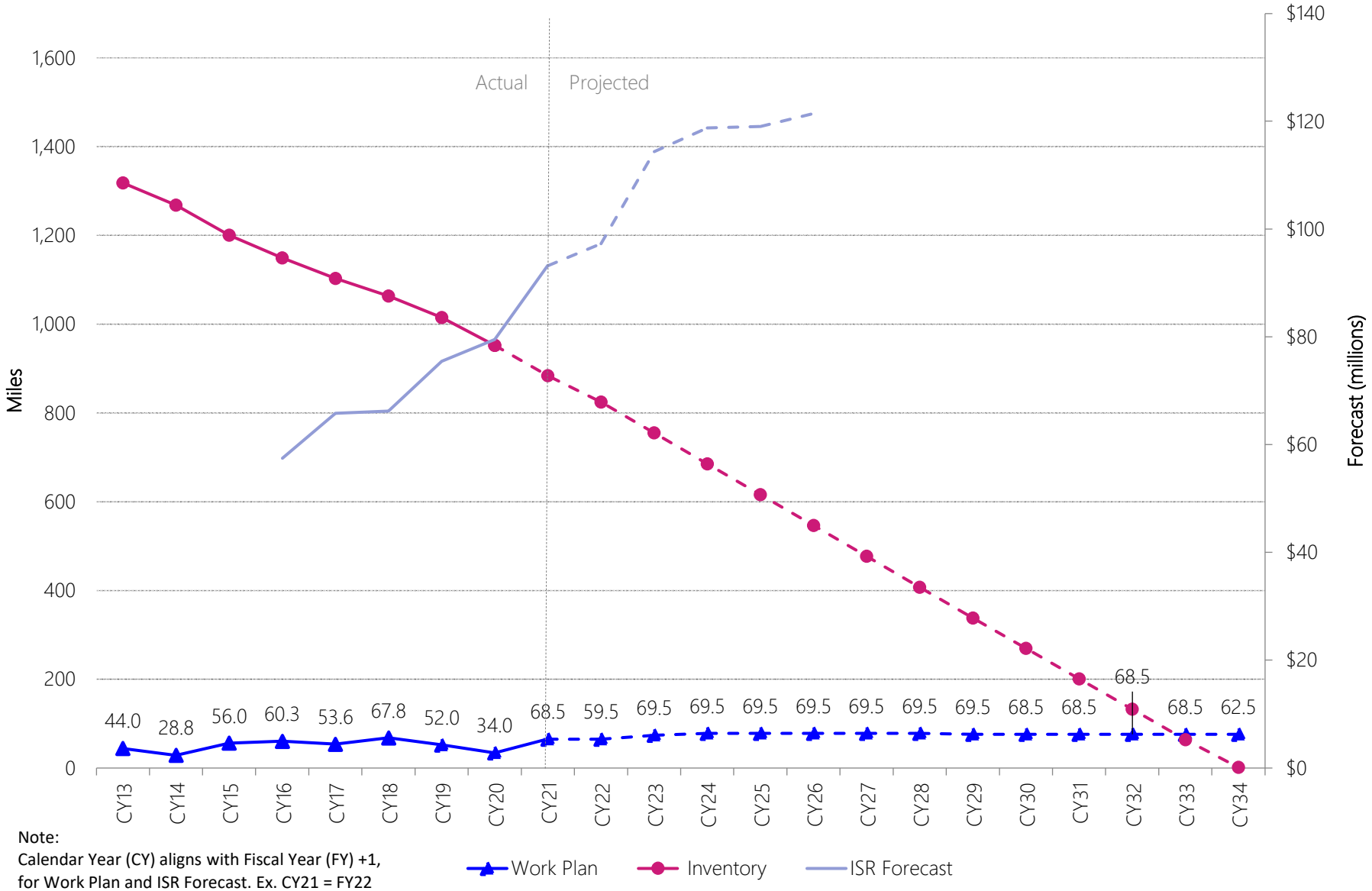
Response:

Please refer to Attachment PUC 3-14 for the graph showing LPP main inventory trends and the five year budget plan.

Prepared by or under the supervision of: Corey Hogg

RI Leak Prone Pipe Main Replacement

Proactive Leak Prone Pipe, CSC, Reinforcement, Reliability and others



Note:
Calendar Year (CY) aligns with Fiscal Year (FY) +1,
for Work Plan and ISR Forecast. Ex. CY21 = FY22

PUC 3-15
System Integrity Report/Mains/Services/General

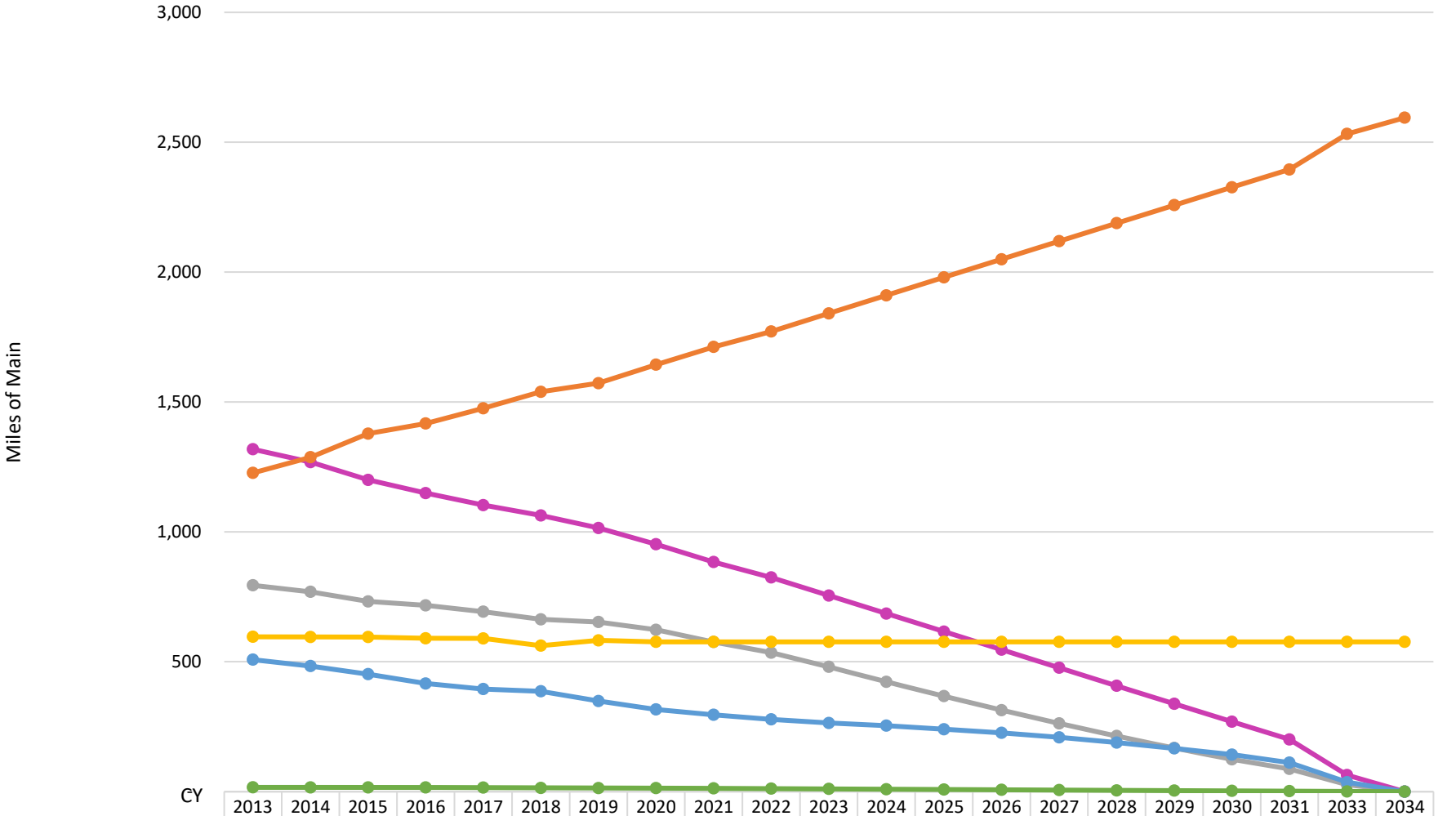
Request:

If possible (i.e., at the material type level of detail), please update the figure on Bates 146.
a. first using National Grid's forecast on Bates 134, and
b. second using a forecast based on level spending as in PUC 3-13.

Response:

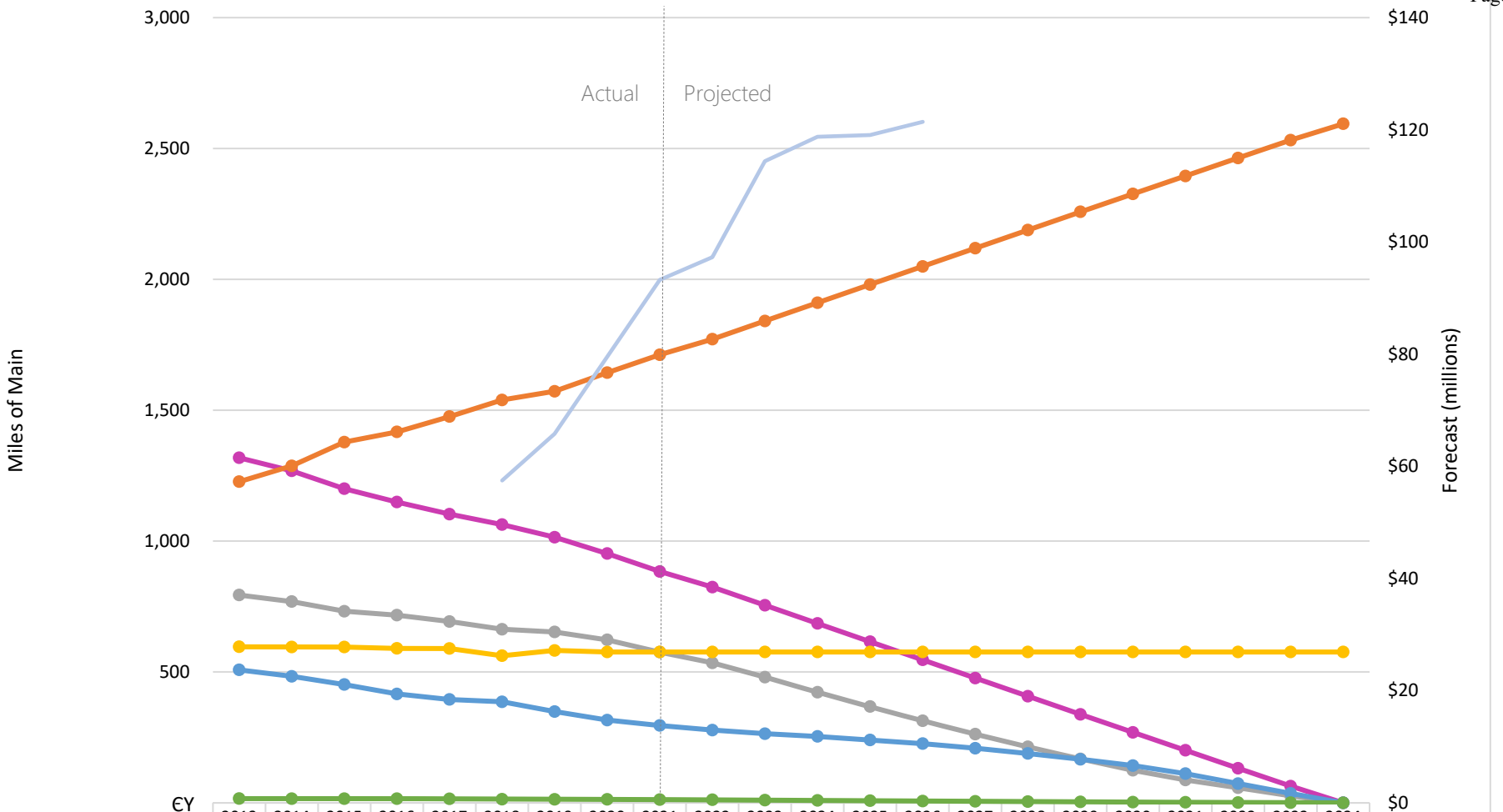
a. Please refer to Attachment PUC 3-15-1 Graph 1.
b. Please refer to Attachment PUC 3-15-2 Graph 2 using the level spending in PUC 3-14.

Prepared by or under the supervision of: Corey Hogg



CY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2033	2034
Total LPP Inventory	1,318	1,268	1,200	1,149	1,103	1,063	1,015	952	884	824	755	685	616	546	477	407	338	269	201	64	0
Plastic	1,227	1,287	1,378	1,417	1,476	1,539	1,572	1,643	1,712	1,771	1,841	1,910	1,980	2,049	2,119	2,188	2,258	2,326	2,395	2,532	2,594
Cast Iron	794	769	732	717	693	663	653	623	576	535	480	422	368	313	262	214	168	124	87	27	0
Steel - Protected	596	595	595	590	590	562	582	576	576	576	576	576	576	576	576	576	576	576	576	576	576
Steel - Unprotected	508	483	452	416	395	386	349	316.1	296	278	264	254	240	226	209	189	166	142	112	36	0
Ductile Iron	16	16	16	16	16	14	13	13	12	12	10	9	8	7	6	5	4	3	2	1	0

Years



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Total LPP Inventory	1,318	1,268	1,200	1,149	1,103	1,063	1,015	952	884	824	755	685	616	546	477	407	338	269	201	132	64	0
Plastic	1,227	1,287	1,378	1,417	1,476	1,539	1,572	1,643	1,712	1,771	1,841	1,910	1,980	2,049	2,119	2,188	2,258	2,326	2,395	2,463	2,532	2,594
Cast Iron	794	769	732	717	693	663	653	623	576	535	480	422	368	313	262	214	168	124	87	57	27	0
Steel - Protected	596	595	595	590	590	562	582	576	576	576	576	576	576	576	576	576	576	576	576	576	576	576
Steel - Unprotected	508	483	452	416	395	386	349	316.1	296	278	264	254	240	226	209	189	166	142	112	74	36	0
Ductile Iron	16	16	16	16	16	14	13	13	12	12	10	9	8	7	6	5	4	3	2	1	1	0
ISR Forecast				$57	$66	$66	$75	$80	$93	$97	$114	$119	$119	$121								

Note:
Calendar Year (CY) aligns with Fiscal Year (FY) +1, for Work Plan and ISR Forecast.

PUC 3-16
System Integrity Report/Mains/Services/General

Request:

Regarding the main growth reported on Bates 95

a. What is the definition of main growth for this data set and is the data net of any adjustments?
b. What is the relatively high main growth in 2014.

Response:

a. Main growth refers to the additional miles of mains added to the system due to a customer's demand.
b. National Grid completed two large commercial main extension projects in 2014. Each project resulted in the installation of over three miles of new gas main. Together, these projects totaled more than 40% of the entire Growth portfolio for the year.

Prepared by or under the supervision of: Corey Hogg

PUC 3-17
System Integrity Report/Mains/Services/General

Request:

Regarding leak cause, for example as reported for mains on Bates 104, does National Grid only know the leak cause for repaired leaks, or can leak receipts be classified by cause?

Response:

The Company can only determine the cause of a leak after the leaking facility is exposed at the time of repair. Therefore, the Company cannot determine the leak cause on unrepaired leaks/leak receipts.

Prepared by or under the supervision of: Corey Hogg

PUC 3-18
System Integrity Report/Mains/Services/General

Request:

Are cast iron joint leaks the primary cause of leak receipts?

Response:

Cast iron leaks are the cause of over 80% of the repairs made in any given year. Consequently, it can be concluded that most of the leak receipts may be caused by leaks on cast iron pipelines.

PUC 3-19
System Integrity Report/Mains/Services/General

Request:

Does National Grid maintain any data on the location of cast iron joints. If not, could such a dataset be reliably created with existing equipment?

Response:

The Company does not maintain a database on the location of cast iron joints. These facilities were installed in the early 1900s and joint locations were not maintained at the time of installation. To determine the specific location of each cast iron joint in its system, the Company would need to dig hundreds of thousands of test holes to locate the joints or perform robotic inspection to determine joint location. However, cast iron main typically has a joint every 12 feet, and thus, it is not essential for safe and reliable system operation to have a specific location of each joint. Rather, once a single joint is located, it is likely the adjacent joints are approximately 12 feet away.

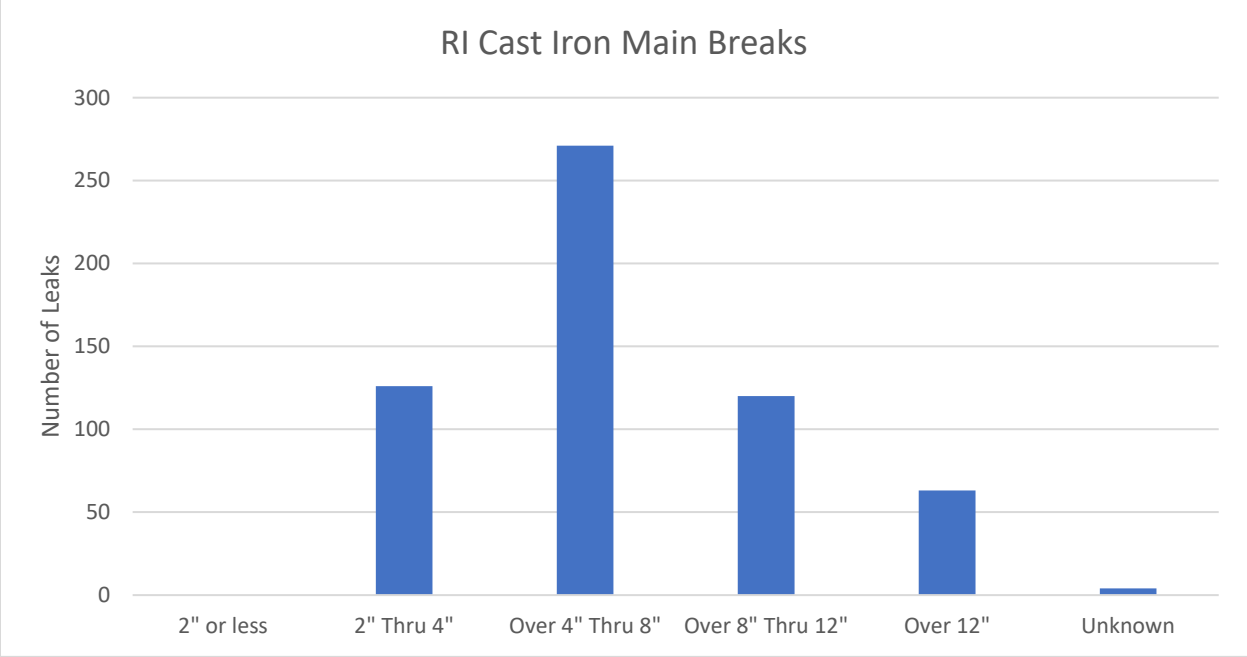
PUC 3-20
System Integrity Report/Mains/Services/General

Request:

If possible, please show the cast iron joint leak repairs and/or receipts by the pipe diameter bins used on Bates 111.

Response:

Please refer to the table below for the 2020 cast iron joint leaks repaired by pipe diameter size.



Prepared by or under the supervision of: Corey Hogg

PUC 3-21
System Integrity Report/Mains/Services/General

Request:

Does the orange line representing average customer used rate per heating degree day on Bates 128 indicate that there is a trend of customers using more gas per heating degree day over the period shown? If so, please explain why this would be the case given the investments ratepayers have made in energy efficiency over the same period.

Response:

The Company notes that there is a slight increase on customer usage per Heating Degree Days in 2016 and 2020. A detailed analysis of average customer use for each rate class would need to be performed to determine the root cause for the increases and if this increase is related to factors such as changes in residential verses commercial/industrial heating load and whether 2020 average customer use patterns were impacted by the Covid-19 pandemic, economic factors or both.

PUC 3-22
System Integrity Report/Mains/Services/General

Request:

Please define gross unaccounted for gas as shown on Bates 129. If this is not the data relevant to rates and tariffs (e.g., NG-Gas 101) then please also provide the relevant data over the period shown. If this data represents a formula-based metric, please provide National Grid's estimates for actual lost and unaccounted for gas.

Response:

The title on slide Bates 129 should state "% Lost and Unaccounted For Gas" instead of Gross Unaccounted for Gas. The Lost and Unaccounted for Gas (LAUF) is defined in the instructions for completing Form PHMSA F 7100.1-1 (rev 5-2021). Please refer to Attachment PUC 3-22-1 Form PHMSA F 7100.1-1 (rev 5-2021) Part G for LAUF definition.

Please refer to attachments PUC 3-22-2 to PUC 3-22-11 for the 2011 to 2020 data used to calculate % LAUF, which includes %LAUF with and without adjustments.

Prepared by or under the supervision of: Corey Hogg

Instructions (rev 5-2021) for completing Form PHMSA F 7100.1-1 (rev 5-2021)

ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

All section references are to Title 49 of the Code of Federal Regulations. Reporting requirements are contained in Part 191, "Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports and Safety Related Condition Reports." Except as provided in §191.11(b), each operator of a gas distribution pipeline (see definitions below) must submit an annual report Form PHMSA F 7100.1-1 for the preceding calendar year not later than **March 15th**. Be sure to report TOTAL miles of main pipeline and services in the system at the end of the reporting year, including additions to the system during the year. The annual reporting period is on a calendar year basis ending on December 31st of each year.

If you need copies of the Form PHMSA F 7100.1-1 and/or instructions, they can be found on http://www.phmsa.dot.gov/pipeline/library/forms. The documents are included in the section titled Accident/Incident/Annual Reporting Forms.

ONLINE SUBMISSION IS REQUIRED UNLESS AN ALTERNATIVE REPORTING METHOD IS GRANTED BY PHMSA

ALTERNATE REPORTING METHOD

If electronic reporting imposes an undue burden and hardship, an operator may submit a written request for an alternative reporting method to the Information Resources Manager, Office of Pipeline Safety, Pipeline and Hazardous Materials Safety Administration, PHP-20, 1200 New Jersey Avenue, SE Washington DC 20590. The request must describe the undue burden and hardship. PHMSA will review the request and may authorize, in writing, an alternative reporting method. An authorization will state the period for which it is valid, which may be indefinite. An operator must contact PHMSA at 202-366-8075, or electronically to informationresourcesmanager@dot.gov or make arrangements for submitting a report that is due after a request for alternative reporting is submitted but before an authorization or denial is received.

ONLINE REPORTING METHOD

Annual Reports must be submitted online through the PHMSA Portal at https://portal.phmsa.dot.gov/portal, unless an alternate method is approved (see Alternate Reporting Methods below).

You will not be able to submit reports until you have met all of the Portal registration requirements – see http://opsweb.phmsa.dot.gov/portal_message/PHMSA_Portal_Registration.pdf
Completing these registration requirements could take several weeks. Plan ahead and register well in advance of the report due date.

Use the following procedure for online reporting:

1. Go to the PHMSA Portal at https://portal.phmsa.dot.gov/portal

2. Enter PHMSA Portal Username and Password ; press *enter*

Instructions (rev 5-2021) for completing Form PHMSA F 7100.1-1 (rev 5-2021)
ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

3. Select OPID; press "*continue"* button.

4. Under "**Create Reports**" on the left side of the screen, under *Annual* select "Gas Distribution" and proceed with entering your data. *Note: Data fields marked with a single asterisk are considered required fields that must be completed before the system will accept your initial submission.* Also, only one annual report by commodity for an OPID may be submitted per year.

5. To save intermediate work without formally submitting it to PHMSA, click **Save**. To modify a draft of an annual report that you saved, go to **Saved Reports** and click on *Gas Distribution*. Locate your saved report by the date, report year, or commodity. Select the record by clicking on it once, and then click **Modify** above the record.

6. Once all sections of the form have been completed, click on **Validate** to ensure all required fields have been completed and data meets all other requirements. A list of errors will be generated that must be fixed prior to submitting an Annual Report.

7. Click **Submit** when you have completed the Report (for either an Initial Report or a Supplemental Report), and are ready to initiate formal submission of your Report to PHMSA.

8. A confirmation message will appear that confirms a record has been successfully submitted. To save or print a copy of your submission, go to **Submitted Reports** on the left hand side, and click on *Gas Distribution*. Locate your submitted report by the date, report year, or Commodity Group, and then click on the PDF icon to either open the file and print it, or save an electronic copy.

9. To submit a *Supplemental Report*, go to **Submitted Reports** on the left hand side, and click on *Gas Distribution*. Locate your submitted report by the date, report year, or Commodity Group. Select the record by clicking on it once, and then click "Create Supplemental".

GENERAL INSTRUCTIONS

The following definitions are from § 192.3:

1. "Distribution line" means a pipeline other than a gathering or transmission line.

2. "Gathering line" means a pipeline that transports gas from a current production facility to a transmission line or main.

3. "Transmission line" means a pipeline, other than a gathering line, that:
   a. Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not downstream from a distribution center;
   b. Operates at a hoop stress of 20 percent or more of SMYS; or

Instructions (rev 5-2021) for completing Form PHMSA F 7100.1-1 (rev 5-2021)
ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

c. Transports gas within a storage field. A large volume customer may receive similar volumes of gas as a distribution center, and includes factories, power plants, and institutional users of gas.

4. "Operator" means a person who engages in the transportation of gas.

Make an entry in each block for which data are available. Estimate data if necessary. Avoid entering any data in the **UNKNOWN** columns, if possible. Some companies may have very old pipe for which installation records do not exist. Estimate the total of such mileage in the **UNKNOWN** column of Part B, item 2 "Miles of Main in System at End of Year" and item 3 "Number of Services in System at End of Year", and item 4 "Miles of Main and Number of Services by Decade of Installation."

Do not report miles of pipe, pipe segments, or pipeline in feet. When main miles and service counts for the same set of pipelines is reported in different parts of the form, the online system will require the different parts to be consistent. Main miles and service counts over 60 must be within 0.5% of the baseline and values under 60 must be within 0.3 miles for main and service counts must match exactly. Part B4, decade of installation, will serve as the baseline for main miles and service counts. For example, if you report 60 miles of main in Part B4, the miles of main in Parts B1 and B2 must be within 0.3 miles of 60. For main miles, use the number of decimal places needed to satisfy these consistency checks. Service counts may only be entered as positive integers.

For a given OPID, a separate Annual Report is required for each Commodity Group within that OPID. As an example, if an operator uses a single OPID and has one set of pipeline facilities transporting natural gas and another transporting landfill gas, this operator must file two Annual Reports – one Annual Report covering natural gas facilities and a second for the landfill gas facilities. When a pipeline facility transports two or more Commodity Groups, the pipeline facility should be reported only once under the predominantly transported Commodity Group.

PART A – OPERATOR INFORMATION

1. **Name of Operator**

This is the company name associated with the OPID. For online entries, the name will be automatically populated based on the OPID entered in A3. If the name that appears is not correct, you need to submit an Operator Name Change (Type A) Notification.

2. Location of Office Where Additional Information May Be Obtained

Enter the appropriate address.

3. Operator's 5-digit Identification Number (OPID)

For online entries, the OPID will automatically populate based on the selection you made when entering the Portal. If you have log-in credentials for multiple OPID, be sure the report is being created for the appropriate OPID. Contact PHMSA's Operator Hotline at 202-366-8075 if you need assistance with an OPID.

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ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

4. Headquarters Name and Address

This is the headquarters address associated with the OPID. For online entries, the address will automatically populate based on the OPID entered in A3. If the address that appears is not correct, you need to change it in the online Contacts module.

5. State of Operation

Enter the **State for which information is being reported. Submit a separate report for each State** in which the company operates a gas distribution pipeline system.

6. Commodity Group

It is a PHMSA requirement that operators submit separate Reports for each Commodity Group within a particular OPID.

File a separate Annual Report for each of the following Commodity Group**s**:

Natural Gas

Synthetic Gas (such as manufactured gas based on naphtha)

Hydrogen Gas

Propane Gas

Landfill Gas (includes biogas)

Other Gas – If this Commodity Group is selected, report the name of the other gas in the space provided.

Note: When a pipeline facility transports two or more of the above Commodity Groups, the pipeline facility should be reported only once under the predominantly transported Commodity Group. For example, if an operator has a pipeline segment that is used to transport natural gas during the majority of the year and propane for a couple of weeks, that operator should only file an annual report for the natural gas. If an operator has two pipeline segments with one pipeline segment used to transport natural gas and the other pipeline segment transporting hydrogen gas, that operator should file two annual reports - 1 report for natural gas and 1 report for hydrogen gas.

7. Operator Type

Enter the Type of Operator based on the structure of the company included in this OPID for which this report is being submitted. "Investor Owned" means the operator is controlled by a corporation with publicly traded stock. "Municipally Owned" means the operator is controlled by any type of State or local government entity including, county, parish, utility district, or municipality. "Privately Owned"

means the operator is controlled by a corporation without publicly traded stock. All other operators should report "Cooperative."

PART B – SYSTEM DESCRIPTION

"Coated" means pipe coated with any effective hot or cold applied dielectric coating or wrapper.

"Reconditioned Cast Iron" means cast iron gas distribution pipe that has been lined internally by use of suitable materials that ensure safe operation at an MAOP not to exceed the previously established MAOP. "Reconditioned Cast Iron" does not include cast iron pipe inserted with a gas pipe that is, by itself, suitable for gas service under Part 192, e.g., an ASTM D2513 pipe meeting code requirements for the intended gas service. Such insertions shall be reported as the material used in the insertion. The intent of the definition is to make a clear distinction between a liner and inserted pipe. An example of "Reconditioned Cast Iron" would be the insertion of a liner inside cast iron pipe where the liner relies on the structural integrity of the cast iron pipe. For details on liner insertion, see ASTM F2207, Standard Specification for Cured-in-Place Pipe Lining System for Rehabilitation of Metallic Gas Pipe. Methods of installation like pipe-splitting or bursting that involve the installation of a new stand-alone pipe while the host pipe is destroyed does not result in "Reconditioned Cast Iron".

"PVC" means polyvinyl chloride plastic.

"PE" means polyethylene plastic.

"ABS" means acrylonitrile-butadiene-styrene plastic.

"Cathodically protected" applies to both "bare" and "coated."

"Other" means a pipe of any material not specifically designated on the form. If you enter miles of main or services in the "other" category, describe these materials in the appropriate text box.

"Number of service" is the number of service lines, not the number of customers served.

Provide miles of main and numbers of services by decade installed in Part B, section 4.

If you do not know the decade of installation of the pipe because there are no records containing such information, enter an estimate in the UNKNOWN column. The sum total of mileage and number of services reported for Part B, section 4 must be consistent with total mileage and number of services reported in sections 1, 2, and 3 in Part B.

PART C – TOTAL LEAKS AND HAZARDOUS LEAKS ELIMINATED/REPAIRED DURING YEAR

In the appropriate column, include the total number of leaks and the number of hazardous leaks eliminated by repair, replacement or other action during the reporting year. The number of "hazardous leaks" eliminated or repaired during the year is reported as a performance measure for integrity management per § 192.1007(g). When reporting leaks or hazardous leaks eliminated by replacing or

abandoning a segment of pipe, count the leaks that existed in the pipe segment before it was replaced or abandoned. Also include leaks and hazardous leaks reported on form PHMSA 7100.1, "Incident Report Gas Distribution Systems." A reportable incident is one described in § 191.3. Do not include leaks that occurred during testing.

A "leak" is defined as an unintentional escape of gas from the pipeline. Do NOT report a leak determined to be non-hazardous and eliminated by lubrication, adjustment, or tightening.

A "hazardous leak" means a leak that represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until the conditions are no longer hazardous. A "hazardous leak" which occurs aboveground or belowground is a leak and must be reported.

Operators who do not grade leaks for hazard, but rather repair all leaks when found, need not grade repaired leaks solely for the purpose of this report. Such operators treat all leaks as if hazardous. Operators who do not grade leaks must report the same values for both total and hazardous leaks for each cause.

The "number of known system leaks at the end of the year scheduled for repair" is the total number pipeline system leaks being monitored and scheduled for repair at the end of the calendar year. Monitored leaks also include those leaks which have been temporarily repaired until a permanent repair can be performed. These leaks are non-hazardous unless reclassified following the operator's operation and maintenance procedures.

Enter the number of hazardous leaks by any cause involving a mechanical joint failure during the calendar year. "Mechanical joint" means a connection of two sections of pipe using one of the following types of fittings: stab, nut follower, bolted, or other compression type. The first three types are further described below:

Stab - Internally there are specially designed components including an elastomer seal, such as an "O" ring, and a gripping device to affect pressure sealing and pull-out resistance capabilities. Self-contained stiffeners are included in this type of fitting. With this style fitting the operator would have to prepare the pipe ends, mark the stab depth on the pipe, and "stab" the pipe in to the depth prescribed for the fitting being used.

Nut Follower – The components are generally a body; a threaded compression nut or a follower; an elastomer seal ring; a stiffener or an integrated stiffener for plastic pipe; and, with some, a gripping ring. Normally the design concept of this type of fitting typically includes an elastomer seal in the assembly. The seal, when compressed by tightening of a threaded compression nut grips the outside of the pipe, affecting a pressure-tight seal and, in some designs, providing pull-out resistance. For plastic pipe, the inside of the pipe wall should be supported by the stiffener under the seal ring and under the gripping ring (if incorporated in the design), to prevent collapse of the pipe. A lack of this support could result in a loss of the seal affected by the seal ring or the gripping of the pipe for pull-out resistance. This fitting style is normally used in pipelines 2-inches in diameter and smaller. There are two categories of this type of joining device manufactured. One type is provides a seal only, and the other provides a seal plus pipe restraint against pull-out.

Bolted – The bolt type mechanical fitting has similar components as the nut follower except instead of a threaded compression nut or follower, there is a bolt arrangement. This fitting style is most often used in pipelines 2-inches in diameter and larger.

Leak causes are classified as:

CORROSION FAILURE: leak caused by galvanic, atmospheric, stray current, microbiological, or other corrosive action. A corrosion release or failure is not limited to a hole in the pipe or other piece of equipment. If the bonnet or packing gland on a valve or flange on piping deteriorates or becomes loose and leaks due to corrosion and failure of bolts, it is classified as Corrosion. (Note: If the bonnet, packing, or other gasket has deteriorated to failure, whether before or after the end of its expected life, but not due to corrosive action, report it under a different cause category, such as G4 Incorrect Operation for improper installation or G6 Equipment Failure if the gasket failed)

NATURAL FORCE DAMAGE: leak caused by outside forces attributable to causes NOT involving humans, such as earth movement, earthquakes, landslides, subsidence, heavy rains/floods, lightning, temperature, thermal stress, frozen components, high winds (Including damage caused by impact from objects blown by wind), or other similar natural causes. Lightning includes both damage and/or fire caused by a direct lighting strike and damage and/or fire as a secondary effect from a lightning strike in the area. An example of such a secondary effect would be a forest fire started by lightning that results in damage to a gas distribution system asset which results in an incident.

EXCAVATION DAMAGE: leak resulting directly from excavation damage by operator's personnel (oftentimes referred to as "first party" excavation damage) or by the operator's contractor (oftentimes referred to as "second party" excavation damage) or by people or contractors not associated with the operator (oftentimes referred to as "third party" excavation damage). Also, this section includes a release or failure determined to have resulted from previous damage due to excavation activity. For damage from outside forces OTHER than excavation which results in a release, use Natural Force Damage or Other Outside Force, as appropriate.

OTHER OUTSIDE FORCE DAMAGE: leak resulting from outside force damage, other than excavation damage or natural forces such as:

- Nearby Industrial, Man-made or Other Fire/Explosion as Primary Cause of Incident (unless the fire was caused by natural forces, in which case the leak should be classified Natural Forces. Forest fires that are caused by human activity and result in a release should be reported as Other Outside Force),
- Damage by Car, Truck, or Other Motorized Vehicle/Equipment NOT Engaged in Excavation. Other motorized vehicles/equipment includes tractors, mowers, backhoes, bulldozers and other tracked vehicles, and heavy equipment that can move. Leaks resulting from vehicular traffic loading or other contact (except report as "Excavation Damage" if the activity involved digging, drilling, boring, grading, cultivation or similar activities.
- Damage by Boats, Barges, Drilling Rigs, or Other Maritime Equipment or Vessels so long as those activities are not excavation activities. If those activities are excavation activities such as dredging or bank stabilization or renewal, the leak repair should be reported as "Excavation Damage".
- Previous Mechanical Damage NOT Related to Excavation. A leak caused by damage that occurred at some time prior to the release that was apparently NOT related to excavation activities, and would

include prior outside force damage of an unknown nature, prior natural force damage, prior damage from other outside forces, and any other previous mechanical damage other than that which was apparently related to prior excavation. Leaks resulting from previous damage sustained during construction, installation, or fabrication of the pipe, weld, or joint from which the release eventually occurred are to be reported under "Pipe, Weld, or Joint Failure". Leaks resulting from previous damage sustained as a result of excavation activities should be reported under "Excavation Damage" unless due to corrosion in which case it should be reported as a corrosion leak.

- Intentional Damage/. Vandalism means willful or malicious destruction of the operator's pipeline facility or equipment. This category would include pranks, systematic damage inflicted to harass the operator, motor vehicle damage that was inflicted intentionally, and a variety of other intentional acts.
- Terrorism, per 28 C.F.R. § 0.85 General functions, includes the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.
- Theft. Theft means damage by any individual or entity, by any mechanism, specifically to steal, or attempt to steal, the transported gas or pipeline equipment.

PIPE, WELD, OR JOINT FAILURE : Leak resulting from a material defect within the pipe, component or joint due to faulty manufacturing procedures, desing defects, or in-service stresses such as vibration, fatigue and environmental cracking. Material defect means an inherent flaw in the material or weld that occurred in the manufacture or at a point prior to construction, fabrication or installation. Design defect means an aspect inherent in a component to which a subsequent failure has been attributed that is not associated with errors in installation, i.e., is not a construction defect. This could include, for example, errors in engineering design. Fitting means a device, usually metal, for joining lengths of pipe into various piping systems. It includes couplings, ells, tees, crosses, reducers, unions, caps and plugs. Any leak that is associated with a component or process that joins pipe such as threaded connections, flanges, mechanical couplings, welds, and pipe fusions that leak as a result from poor construction should be classified as "Incorrect Operation". Leaks resulting from failure of original sound material from force applied during construction that caused a dent, gouge, excessive stress, or other defect, including leaks due to faulty wrinkle bends, faulty field welds, and damage sustained in transportation to the construction or fabrication site that eventually resulted in a leak, should be reported as "Pipe, Weld or Joint Failure".

EQUIPMENT FAILURE: leak caused by malfunctions of control and relief equipment including regulators, valves, meters, compressors, or other instrumentation or functional equipment, Failures may be from threaded components, Flanges, collars, couplings and broken or cracked components, or from O- Ring failures, Gasket failures, seal failures, and failures in packing or similar leaks. Leaks caused by overpressurization resulting from malfunction of control or alarm device; relief valve malfunction: and valves failing to open or close on command; or valves which opened or closed when not commanded to do so. If overpressurization or some other aspect of this incident was caused by incorrect operation, the incident should be reported under "Incorrect Operation."

INCORRECT OPERATION: leak resulting from inadequate procedures or safety practices, or failure to follow correct procedures, or other operator error. It includes leaks due to improper valve selection or operation, inadvertent overpressurization, or improper selection or installation of equipment. It includes a leak resulting from the unintentional ignition of the transported gas during a welding or maintenance activity.

OTHER CAUSE: leak resulting from any other cause not attributable to the above causes. A best effort should be made to assign a specific leak cause before choosing the Other cause category. An operator replacing a bare steel pipeline with a history of external corrosion leaks without visual observation of the actual leak, may form a hypothesis based on available information that the leak was caused by external corrosion and assign the Corrosion cause category to the leak.

PART D – EXCAVATION DAMAGE

Excavation damages are reported as a measure of the effectiveness of integrity management programs (§ 192.1007(g)).

Report the "Number of Excavation Damages" experienced during the calendar year by the following apparent root cause which are classified as:

One-Call Notification Practices Not Sufficient: Damages resulting from no notification made to the One-Call Center; or notification to one-call center made, but not sufficient; or wrong information provided to One Call Center.

Locating Practices Not Sufficient: Damages resulting from facility could not be found or located; or facility marking or location not sufficient; or facility was not located or marked; or incorrect facility records/maps.

Excavation Practices Not Sufficient: Damages resulting from failure to maintain marks; or failure to support exposed facilities; or failure to use hand tools where required; or failure to test-hole (pot-hole); or improper backfilling practices; or failure to maintain clearance; or other insufficient excavation practices.

Other: Damages resulting from One-Call Center error; or abandoned facility; or deteriorated facility; or previous damage or data not collected; or other.

The Total Number of Excavation Damages will be calculated automatically based on the data entered. For this purpose, "Excavation Damage" means any impact that results in the need to repair or replace an underground facility due to a weakening, or the partial or complete destruction, of the facility, including, but not limited to, the protective coating, plastic pipe tracer wire, lateral support, cathodic protection or the housing for the line device or facility.

Report also the "Number of Excavation Tickets" received during the year, (i.e., receipt of information by the operator from the notification center).

PART E – EXCESS FLOW VALVE (EFV) AND SERVICE VALVE DATA

Report the number of EFV and manual service line shut-off valves installed during the calendar year. Report the estimated total number of EFV and manual service line shut-off valves in the system at the end of the calendar reporting year. Be sure to include the number installed during the calendar year when reporting the estimated number in the system at the end of the calendar year.

Instructions (rev 5-2021) for completing Form PHMSA F 7100.1-1 (rev 5-2021)
ANNUAL REPORT FOR CALENDAR YEAR 20_____
GAS DISTRIBUTION SYSTEM

PART F – TOTAL NUMBER OF LEAKS ON FEDERAL LAND REPAIRED/ELIMINATED OR SCHEDULED FOR REPAIR

Federal Lands: As defined in 30 U.S.C. §185, federal lands means "all lands owned by the United States except lands in the National Park System, lands held in trust for an Indian or Indian tribe, and lands on the Outer Continental Shelf." Indicate only those leaks repaired, eliminated, or scheduled for repair during the reporting year, including those incidents reported on Form PHMSA F 7100.1.

PART G – PERCENT OF UNACCOUNTED FOR GAS

"Unaccounted for gas" is gas lost; that is, gas that the operator cannot account for as usage or through appropriate adjustment. Adjustments are appropriately made for such factors as variations in temperature, pressure, meter-reading cycles, or heat content; calculable losses from construction, purging, line breaks, etc., where specific data are available to allow reasonable calculation or estimate; or other similar factors.

State the amount of unaccounted for gas as a percent of total consumption for the 12 months ending June 30 of the reporting year.

[(Purchased gas + produced gas) minus (customer use + company use + appropriate adjustments)] divided by (customer use + company use + appropriate adjustments) times 100 equals percent unaccounted for.

PART H – ADDITIONAL INFORMATION

Include any additional information which will assist in clarifying or classifying the reported data.

PART I - PREPARER

PREPARER is the name of the person most knowledgeable about the report or the person to be contacted for more information. Please include the direct phone number and email address as applicable (e-mail address is desired but not required). It should be noted that PHMSA will use your e-mail address to issue correspondence that is normally sent via mass mailings. "Correspondence" includes notifications such as the annual reminder letter for Annual Report filings.

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2011 *(Using "Annual" Emissions Rates Listed In The EPA STAR Report - in MCF/mile)*

ENTER ALL INVENTORY VALUES IN RED FIELDS WITH DATA FROM THE DOT REPORT
ENTER SENDOUT & GROSS UFG FIELDS IN RED FROM 6/30 UFG DATA SUPPLIED

THE SPREADSHEET CALCULATES EVERYTHING ELSE

AVG SRVC LENGTHS	
RI	65 ft
	from DOT Reports

	RI		
MATERIAL	NUMBER	MILES	LEAKAGE
MAIN - CI		875	209018.884
MAIN - Prot Steel		588	1764.978
MAIN - UP Steel*		597	65669.01
MAIN - Plastic		1103	13239.816
SERV - Cu	209		62.7
SERV - Prot Steel	10422		2084.4
SERV - UP Steel*	56259		95640.3
SERV - Plastic*	123076		1230.76
Total	*189966*	*3163*	
TOTAL LEAKAGE in MCF			**388711**

TOTAL LEAKAGE in DTH *(DTH = MCF x 1.03)*	**400,372**
TOTAL LEAKAGE in MDT	**400**
SENDOUT in MDT	**39,986**
GROSS UFG in MDT	**1,486**
Gross UFG (% of Sendout)	**3.72%**
LEAKAGE (as % of Sendout)	**1.00%**
NET UFG	**2.72%**
NET UFG (Round to 1 Dec Pl)	**2.7%**
NET UFG in MDT	**1,086**
NET UFG in DT	**1,085,944**
NET UFG in MMBTU	**1,085,944**

**** UP Steel Svcs for Upstate include CI***

**** UP Steel Main for RI includes Ductile iron & Other***

**** UP Steel Svcs for RI include CI & DI Svcs***

**** Plastic Svcs for RI include Other Svcs***

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2012 *(Using "Annual" Emissions Rates Listed In The EPA STAR Report - in MCF/mile)*

ENTER ALL INVENTORY VALUES IN RED FIELDS WITH DATA FROM THE DOT REPORT
ENTER SENDOUT & GROSS UFG FIELDS IN RED FROM 6/30 UFG DATA SUPPLIED
THE SPREADSHEET CALCULATES EVERYTHING ELSE

RAW UFG DATA FOR DOT REPORTS

AVG SRVC LENGTHS	
RI	65 ft
	from DOT Reports

RI

MATERIAL	NUMBER	MILES	LEAKAGE
MAIN - CI		875	209018.884
MAIN - Prot Steel		588	1764.978
MAIN - UP Steel*		597	65669.01
MAIN - Plastic		1103	13239.816
SERV - Cu	209		62.7
SERV - Prot Steel	10422		2084.4
SERV - UP Steel*	56259		95640.3
SERV - Plastic*	123076		1230.76
Total	*189966*	*3163*	

TOTAL LEAKAGE in MCF **388711**

TOTAL LEAKAGE in DTH **400,372**
(DTH = MCF x 1.03)

TOTAL LEAKAGE in MDT **400**

SENDOUT in MDT **34,286**
GROSS UFG in MDT **1,222**

Gross UFG (% of Sendout) **3.56%**
LEAKAGE (as % of Sendout) **1.17%**
NET UFG **2.40%**

NET UFG (Round to 1 Dec Pl) **2.4%**

NET UFG in MDT **822**
NET UFG in DT **821,628**
NET UFG in MMBTU **821,628**

**** UP Steel Svcs for Upstate include CI***

**** UP Steel Main for RI includes Ductile iron & O***

**** UP Steel Svcs for RI include CI & DI Svcs***

**** Plastic Svcs for RI include Other Svcs***

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2013 *(Using "Annual" Emissions Rates Listed In The EPA STAR Report - in MCF/mile/Year for main & MCF/Service/Year)*

ENTER ALL INVENTORY VALUES IN RED FIELDS WITH DATA FROM THE DOT REPORT
ENTER SENDOUT & GROSS UFG FIELDS IN RED FROM 6/30 UFG DATA SUPPLIED
THE SPREADSHEET CALCULATES EVERYTHING ELSE

AVG SRVC LENGTHS	
RI	66.09 ft
	from DOT Reports

	RI		
MATERIAL	NUMBER	MILES	LEAKAGE
MAIN - CI		831	198625.73
MAIN - Prot Steel		596	1788.744
MAIN - UP Steel*		524	57652.43
MAIN - Plastic		1227	14725.896
SERV - Cu	207		62.1
SERV - Prot Steel	10150		2030
SERV - UP Steel*	51572		87672.4
SERV - Plastic*	131002		1310.02
Total	*192931*	*3179*	
TOTAL LEAKAGE in MCF			**363867**

**** UP Steel Main for RI includes Ductile iron & Other***

**** UP Steel Svcs for RI include CI & DI Svcs***

**** Plastic Svcs for RI include Other Svcs***

TOTAL LEAKAGE in DTH **374,783**
(DTH = MCF x 1.03)

TOTAL LEAKAGE in MDT **375**

SENDOUT in MDT **39,493**
GROSS UFG in MDT **1,721**

Gross UFG (% of Sendout) **4.36%**
LEAKAGE (as % of Sendout) **0.95%**
NET UFG **3.41%**

NET UFG (Round to 1 Dec Pl) **3.4%**

NET UFG in MDT **1,346**
NET UFG in DT **1,345,823**
NET UFG in MMBTU **1,345,823**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG

YEAR: 2014

ENTER ALL INVENTORY VALUES IN RED FIELDS WITH DATA FROM THE DOT REPOR
ENTER SENDOUT & GROSS UFG FIELDS IN RED FROM 6/30 UFG DATA SUPPLIED
THE SPREADSHEET CALCULATES EVERYTHING ELSE

AVG SRVC LENGTHS		
RI	66.09	ft
	from DOT Reports	

	RI		
MATERIAL	NUMBER	MILES	LEAKAGE
MAIN - CI		806	192621.333
MAIN - Prot Steel		595	1785.738
MAIN - UP Steel*		499	54921.24
MAIN - Plastic		1287	15446.856
SERV - Cu	205		61.5
SERV - Prot Steel	9989		1997.8
SERV - UP Steel*	50397		85674.9
SERV - Plastic*	133024		1330.24
Total	*193615*	*3188*	
TOTAL LEAKAGE in MCF			**353840**

**** UP Steel Svcs for Upstate include CI***

**** UP Steel Main for RI includes Ductile iron & Other***

**** UP Steel Svcs for RI include CI & DI Svcs***

**** Plastic Svcs for RI include Other Svcs***

TOTAL LEAKAGE in DTH	**364,455**
(DTH = MCF x 1.03)	
TOTAL LEAKAGE in MDT	**364**
SENDOUT in MDT	**43,381**
GROSS UFG in MDT	**1,937**
Gross UFG (% of Sendout)	**4.47%**
LEAKAGE (as % of Sendout)	**0.84%**
NET UFG	**3.62%**
NET UFG (Round to 1 Dec Pl)	**3.6%**
NET UFG in MDT	**1,573**
NET UFG in DT	**1,572,545**
NET UFG in MMBTU	**1,572,545**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2015

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services based on factors for each material

MATERIAL	RI NUMBER	MILES	LEAKAGE
Main - CI/WI		785	187335
MAIN - Prot Steel		595	1824
MAIN - UP Steel		452	49848
MAIN - Plastic		1378	13641
SERV - Cu	202		53
SERV - Prot Steel	9800		1717
SERV - UP Steel*	47241		78628
SERV - Plastic *	137600		1205

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Reconditioned Cast Iron Mains, and Wrought Iron Mains

Total Leakage in MCF of Natural Gas	334252
Total Leakage in DTH (DTH = MCF x 1.026 DTH/MCF) (1 DTU = 1 MMBTU)	342943
Total Leakage in MDT	343
SENDOUT in MDT	45288
GROSS UFG in MDT	1738

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	3.84%
Leakage (as % of Sendout)	0.76%
Leakge (as % of Gross UFG))	19.73%
Net UFG (as % of Sendout)	3.08%
Net UFG in MDT	1,395
Net UFG in DT	1,394,870.430
Net UFG in MMBTU	1,394,870

Final Net UFG For DOT Report **3.1%**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2016

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services based on factors for each material

MATERIAL	RI NUMBER	MILES	LEAKAGE
Main - CI/WI		770	183765
MAIN - Prot Steel		590	1809
MAIN - UP Steel		416	45897
MAIN - Plastic		1417	14022
SERV - Cu	201		53
SERV - Prot Steel	9585		1679
SERV - UP Steel	44955		74823
SERV - Plastic	141045		1236

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Cast Iron Mains, and Wrought Iron Mains
Plastic Mains include Reconditioned Cast Iron Mains

Total Leakage in MCF of Natural Gas	323284
Total Leakage in DTH	331689
(DTH = MCF x 1.026 DTH/MCF)	
(1 DTU = 1 MMBTU)	
Total Leakage in MDT	332
SENDOUT in MDT	38515
GROSS UFG in MDT	1022

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	2.65%
Leakage (as % of Sendout)	0.86%
Leakge (as % of Gross UFG))	32.46%
Net UFG (as % of Sendout)	1.79%
Net UFG in MDT	690
Net UFG in DT	690,128
Net UFG in MMBTU	690,128

Final Net UFG For DOT Report **1.8%**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2016

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services based on factors for each material

MATERIAL	RI NUMBER	MILES	LEAKAGE
Main - CI/WI		745	177874
MAIN - Prot Steel		590	1807
MAIN - UP Steel		395	43504
MAIN - Plastic		1476	14607
SERV - Cu	192		50
SERV - Prot Steel	9456		1657
SERV - UP Steel	43113		71757
SERV - Plastic	143744		1259

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Cast Iron Mains, and Wrought Iron Mains
Plastic Mains include Reconditioned Cast Iron Mains

Total Leakage in MCF of Natural Gas	312516
Total Leakage in DTH (DTH = MCF x 1.026 DTH/MCF) (1 DTU = 1 MMBTU)	320642
Total Leakage in MDT	321
SENDOUT in MDT	41489
GROSS UFG in MDT	1236

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	2.98%
Leakage (as % of Sendout)	0.77%
Leakge (as % of Gross UFG))	25.94%
Net UFG (as % of Sendout)	2.21%
Net UFG in MDT	915
Net UFG in DT	915,358
Net UFG in MMBTU	915,358

Final Net UFG For DOT Report **2.2%**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: 2018

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services based on factors for each material

MATERIAL	RI NUMBER	MILES	LEAKAGE
Main - CI/WI		714	170439
MAIN - Prot Steel		562	1723
MAIN - UP Steel		386	42538
MAIN - Plastic		1539	15234
SERV - Cu	189		50
SERV - Prot Steel	9334		1635
SERV - UP Steel	41920		69772
SERV - Plastic	145692		1276

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Cast Iron Mains, and Wrought Iron Mains
Plastic Mains include Reconditioned Cast Iron Mains

Total Leakage in MCF of Natural Gas	302667
Total Leakage in DTH	310536
(DTH = MCF x 1.026 DTH/MCF)	
(1 DTU = 1 MMBTU)	
Total Leakage in MDT	311
SENDOUT in MDT	43889
GROSS UFG in MDT	1399

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	3.19%
Leakage (as % of Sendout)	0.71%
Leakge (as % of Gross UFG))	22.20%
Net UFG (as % of Sendout)	2.48%
Net UFG in MDT	1,088
Net UFG in DT	1,088,132
Net UFG in MMBTU	1,088,132

Final Net UFG For DOT Report **2.5%**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: **2019**

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services ba

	RI		
MATERIAL	NUMBER	MILES	LEAKAGE
Main - CI/WI		703	167813
MAIN - Prot Steel		570	1748
MAIN - UP Steel		349	38460
MAIN - Plastic		1572	15561
SERV - Cu	187		49
SERV - Prot Steel	7043		1234
SERV - UP Steel	44794		74555
SERV - Plastic	143771		1259

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Cast Iron Mains, and Wrought Iron Mains
Plastic Mains include Reconditioned Cast Iron Mains

Total Leakage in MCF of Natural Gas	300679
Total Leakage in DTH (DTH = MCF x 1.026 DTH/MCF) (1 DTH = 1 MMBTU)	308497
Total Leakage in MDT	308.50
SENDOUT in MDT	44552
GROSS UFG in MDT	1454

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	3.26%
Leakage (as % of Sendout)	0.69%
Leakge (as % of Gross UFG))	21.21%
Net UFG (as % of Sendout)	2.57%
Net UFG in MDT	1,146
Net UFG in DT	1,145,698
Net UFG in MMBTU	1,145,698

Final Net UFG For DOT Report **2.6%**

SPREADSHEET FOR CALCULATING DOT REPORT "NET" UFG WITH SYSTEM LEAKAGE ADJUSTMENT

YEAR: **2020**

Enter all inventory values in red fields with data from the DOT Report
Enter Sendout & Gross UFG Values from 6/30 UFG Data Supplied on Raw Data tab
Check the EPA Factors are correct on Raw data tab at provided link
The Spreadsheet calculates everything else

MAINS	Emissions Rates	SERVICES	Emissions Rates
Cast Iron	238.71	Copper	0.2628
Protected Steel	3.066	Protected Steel	0.1752
Unprotected Steel	110.2008	Unprotected Steel	1.6644
Plastic	9.8988	Plastic	0.00876

This table below calculates the estimated leakage of natural gas from the miles of distribution main and number of services ba

MATERIAL	RI NUMBER	MILES	LEAKAGE
Main - CI/WI		673	160692
MAIN - Prot Steel		592	1816
MAIN - UP Steel		316	34825
MAIN - Plastic		1643	16268
SERV - Cu	132		35
SERV - Prot Steel	7286		1277
SERV - UP Steel	45052		74985
SERV - Plastic	141476		1239

Assumptions

Unprotected Steel Svcs Include CI Services
Plastic Services Include Other Services
CI Mains Include Copper Mains, Cast Iron Mains, Wrought Iron Mains, and Ductile Iron Mains
Plastic Mains include Reconditioned Cast Iron Mains

Total Leakage in MCF of Natural Gas	291136
Total Leakage in DTH (DTH = MCF x 1.026 DTH/MCF) (1 DTH = 1 MMBTU)	298706
Total Leakage in MDT	298.71
SENDOUT in MDT	41940
GROSS UFG in MDT	1512

These are all various calculations to show Gross UFG and Leakage in different units and percentages of the total sendout

Gross UFG (% of Sendout)	3.61%
Leakage (as % of Sendout)	0.71%
Leakge (as % of Gross UFG))	19.75%
Net UFG (as % of Sendout)	2.89%
Net UFG in MDT	1,213
Net UFG in DT	1,213,450
Net UFG in MMBTU	1,213,450

Final Net UFG For DOT Report **2.9%**

PUC 3-23
System Integrity Report/Mains/Services/General

Request:

Regarding the data on Bates 129:

a. Please provide the volumes of gas associated with the data
b. What was the market value of these volumes included in rates, if known?
c. What is the value of the greenhouse gas emissions of these volumes (consistent with National Grid's most recent value of greenhouse gases provided in Docket No 5189 Energy Efficiency Plan for 2022)?

Response:

a. Please refer to Attachment PUC 3-23 for the volumes of gas associated with the %LAUF on Bates 129.
b. The market value would be determined by the cost of gas adjusment factor in place at the time the gas was used. The information shown on Bates 129 was compiled on an annual basis only and thus, the actual cost was not calcuated.
c. Please refer to Attachment PUC 3-23 for the Carbon Dioxide (CO_2) Equivalent.

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	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Net Lost and Unaccounted For Gas (LAUF) in MDT	1086	822	1,346	1,573	1,395	690	915	1,088	1,146	1,213
Net LAUF in Metric Cubit Feet (MCF)	1,058,425.25	801,169.59	1,311,890.84	1,533,138.40	1,359,522.84	672,514.62	891,812.87	1,060,428.85	1,116,959.06	1,182,261.21
Metric Ton of CO2 Equivalent	58,001.70	43,904.09	71,891.62	84,015.98	74,501.85	36,853.80	48,871.35	58,111.50	61,209.36	64,787.91

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator-revision-history;

Mcf of natural gas : The emission factor has been updated to 0.0548 metric tons of CO2/Mcf. The previous value was 0.0549 metric tons.

PUC 3-24

System Integrity Report/Mains/Services/General

Request:

Should lost and unaccounted for gas volumes correlate with replacement of leak prone pipe? If not, please explain why. If so, please show whether such a correlation exists for the RI gas system.

Response:

The Company has not studied whether there is a correlation between leak prone pipe replacement and lost and unaccounted for gas (" LAUF"). Please note that the replacement of leak prone pipe is one of several factors included in the calculation of LAUF. The Company uses the "Annual" Emissions Rates Listed in The CFR table W-7 - in MCF/mile/Year for main & MCF/Service/Year" to calculate the amount of gas lost due to leakage (link to table W-7 below). Please refer to the Company's response to PUC 3-22, attachment PUC 3-22 for the calculation of RI LAUF.

https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-W

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PUC 3-25

System Integrity Report/Mains/Services/General

Request:

Does National Grid estimate the volume of gas that leaks from the backlog? If so, please provide the estimate for total backlog and Type 3 leaks.

Response:

The Company is not aware of an industry or regulatory approved method for estimating the volume of leaking gas based on the number of open leaks of a gas system. The Company uses the "Annual" Emissions Rates Listed In The CFR table W-7 - in MCF/mile/Year for main & MCF/Service/Year" to calculate the amount of gas lost due to leakage (link to table W-7 below).

http://www.ecfr.gov/cgibin/retrieveECFR?gp=&SID=dd4bd0378874c9c7419488b0221d37da&mc=true&n=sp40.23.98.w&r=SUBPART&ty=HTML

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PUC 3-26
System Integrity Report/Mains/Services/General

Request:

Please provide a brief explanation of what the information on Bates 132 means and the related consequences. Please indicate if this issue is related to or exacerbated by Gas Business Enablement. Please indicate if additional regularities would occur if the proposed sale of TNEC to PPL includes a new "conversion."

Response:

In 2019, the Company upgraded the leak management system and the mapping system (GIS). Prior to the migration, data was reviewed, and validated which resulted in the trends differing from prior years. The Company is not aware of any additional irregularities occurring during the transition.

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PUC 3-27

System Integrity Report/Mains/Services/General

Request:

Does the data on Bates 143 and 145 correspond to the columns labeled "2020" on Bates 101 and 121, respectively?

Response:

The graph on Bates 101 corresponds to main leaks repaired by material, excluding excavation damages. The data on Bates 143 refers to Main leaks by Material and leak cause, including excavation damages.

The bar graph on Bates 121 refers to service leaks repaired by material. The table on Bates 145 refers to Service leak repairs by material and leak cause, including excavation damages.

Please refer to the tables below as the tables on Bates 143 and 145 were inadvertently cut off. In addition, the dates listed on the tables should be 2020 instead of 2019.

2020 Main Leaks by Material and Leak Cause

RI Main Leaks	Corrosion	Natural Force	Excavation	Other Outside Force	Material or Weld Failure	Equipment	Operations	Other	Total
Plastic	-	-	4	-	-	1	-	-	5
Cast Iron	17	16	2	-	2	10	-	601	648
Recond. Cast Iron	-	-	-	-	-	-	-	-	-
Steel - Protected	12	1	2	-	-	2	-	-	17
Steel - Unprotected	57	1	1	-	-	-	-	-	59
Other	-	-	-	-	-	-	-	-	-
Ductile Iron	1	-	-	-	-	-	-	13	14
Total	87	18	9	-	2	13	-	614	743

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PUC 3-27, page 2

2020 Service Leaks by Material and Leak Cause

RI Service Leaks	Corrosion	Natural Force	Excavation	Other Outside Force	Material or Weld Failure	Equipment	Operations	Other	Total
Plastic	21	-	58	5	2	27	1	3	**117**
Copper	-	-	-	-	-	-	-	-	**-**
Cast Iron	1	-	2	-	-	-	-	-	**3**
Steel - Unprotected	281	-	9	-	-	5	-	1	**296**
Steel - Protected	17	-	1	1	-	2	1	-	**22**
Other	-	-	-	-	-	-	-	-	**-**
Total	320	-	70	6	2	34	2	4	438

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PUC 3-28
System Integrity Report/Mains/Services/General

Request:

Regarding the service inventory trends shown on Bates 147, why caused the kink in the trend from 2018 to 2019?

Response:

The change in trends from 2018 to 2019 was due to data corrections made in conjunction with the implementation of the new mapping system (GIS) and new work management system (Maximo). The Company reviewed and validated inventory data as part of the process to transfer data to the new systems. The Company continues to periodically analyze and validate inventory data and makes necessary corrections to its systems.

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