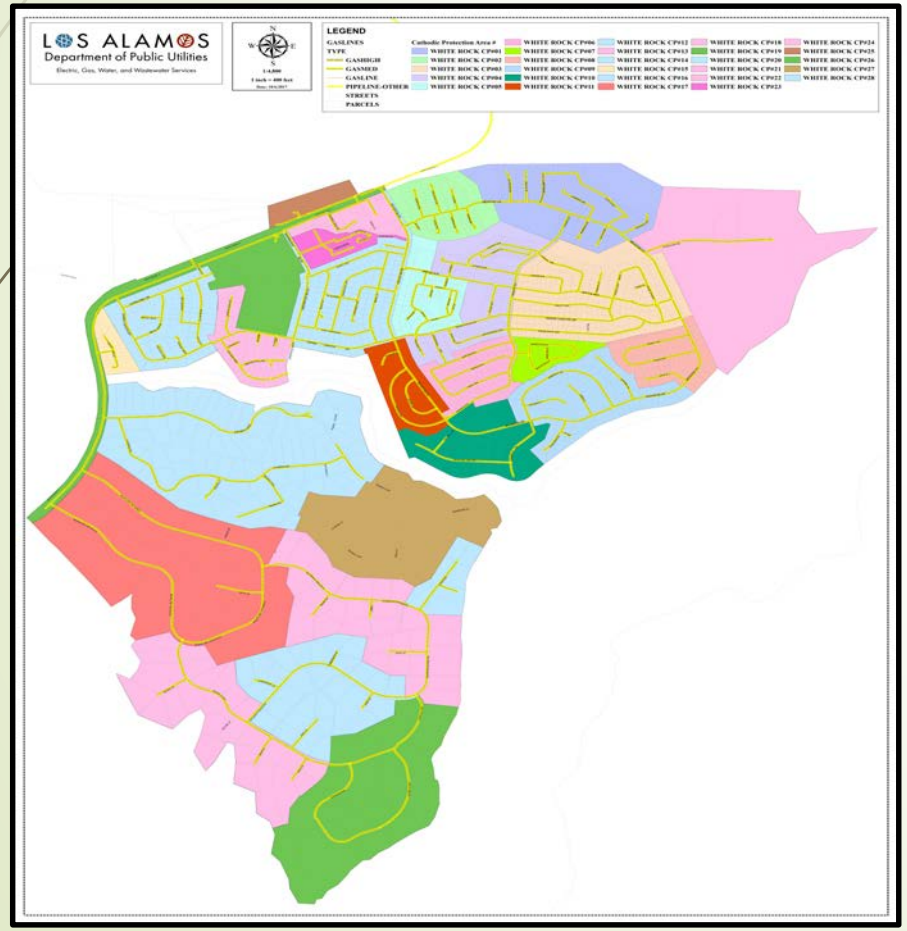
Quarterly Update to BPU Gas Distribution System (GA)

By: Jack Richardson, PE

Deputy Utility Manager – Gas, Water, Sewer (GWS)

BPU Meeting – October 17, 2018

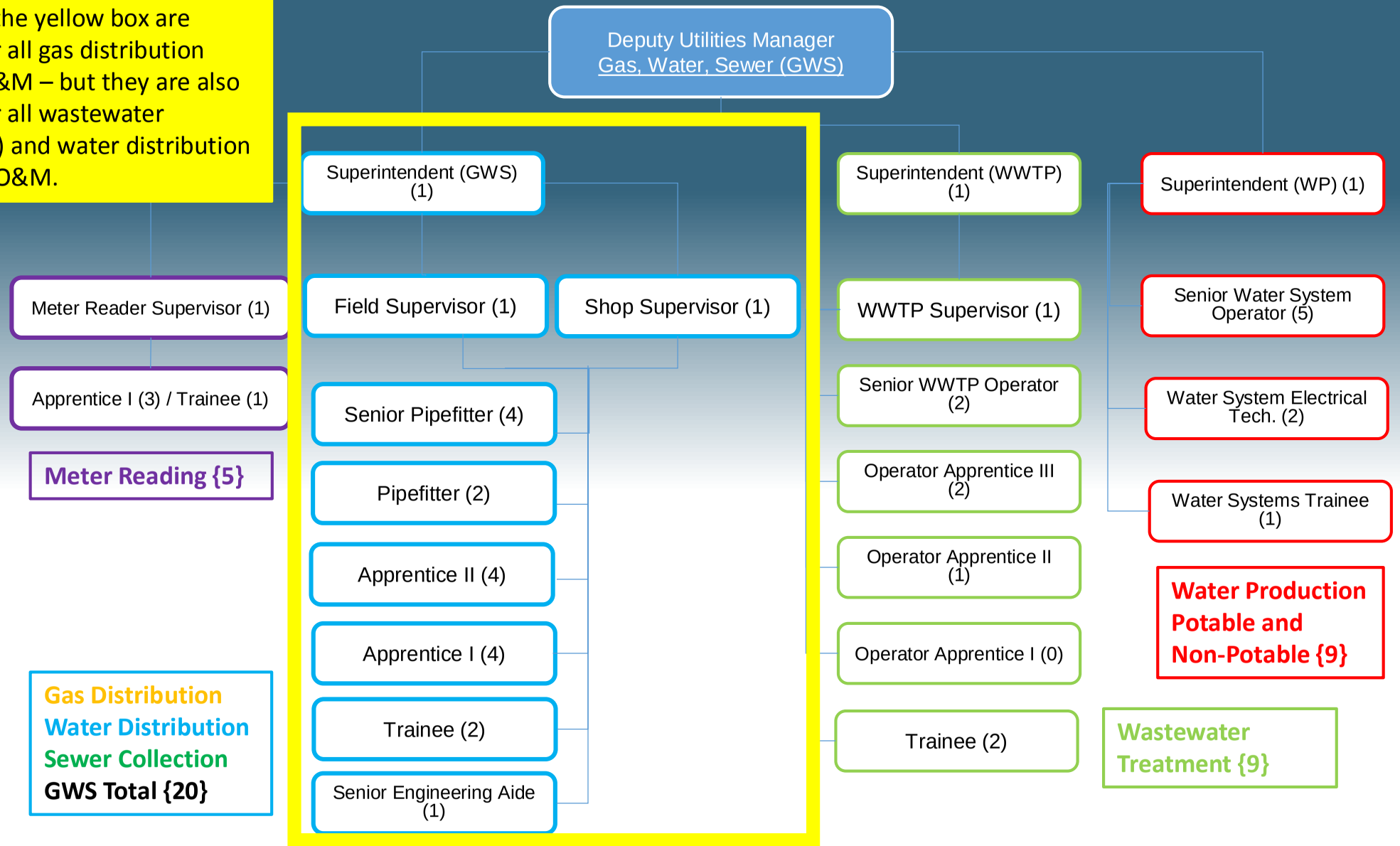


Steel Gas Pipeline Coupons Cut for Service Taps Showing Excellent Pipe Material Condition

White Rock Cathodic Protection Areas Map

GWS ORGANIZATIONAL STRUCTURE

These folks in the yellow box are responsible for all gas distribution (GA) system O&M – but they are also responsible for all wastewater collection (WC) and water distribution (DW) systems O&M.



Gas Distribution System is Heavily Regulated by the Federal & State Government - 1 of 2

- **Federal DOT/Pipeline and Hazardous Material Safety Administration (PHMSA) & New Mexico Public Regulatory Commission (PRC)/Office of Pipeline Safety (OPS) are the Main Regulatory Agencies**
- **Mandated Audits of Gas System Programs (every 3 to 5 years there is a 2 to 3 week audit on each of these programs)**
  - Operator Qualifications Program (OQ)
  - Drug & Alcohol Program (County DPU and Private Contractor Personnel) (D&A)
  - Operation & Maintenance Program (O&M)
  - Public Relations Program (PR)
  - Distribution Integrity Management Plan (DIMP)
- **Regulatory Mandated O&M Work (must be done and documented every year)**
  - Annual Leak Detection Surveys and Class 1, 2 & 3 Repairs; PRV Station Checks and Repairs; Key Valve Exercise, Inspection and Repairs; Cathodic Protection Surveys and Repairs; System Pressure Checks; Excess Flow Valve Checks
- **Virtually Every Activity Done on or for the Gas System Must be Documented and Available for a State Audit - Examples of Typical Documentation Required**
  - **Installation of a Pipe Segment**: Date & Mfr of new pipe; Type, Result, Date & Name of pressure test; Date & Name of pressure test equipment calibration; Type, Condition, Date & Name of existing pipe (condition inspection includes Material, Condition, Coating, Internal & External Corrosion); OQ records (Dates) of every Name (County DPU or Private Contractor); D&A records for every Name (County DPU or Private Contractor)
  - **Leak Survey Patrol**: Date & Type of survey (mobile, walking, combination); Reason for patrol (Annual, Leak Call, Known Damage, etc.); Type & Mfr of leak detection equipment; Date & Name of detection equipment calibration; Discovered Leak Assessment (Grade, Cause, Location); Leak Repair (Grade 1 = Immediate, Grade 2 = Scheduled, Grade 3 = Routine When Ready)(also see “Installation of a Pipe Segment” above); OQ and D&A records (see above)

Gas Distribution System is Heavily Regulated by the Federal & State Government - 2 of 2

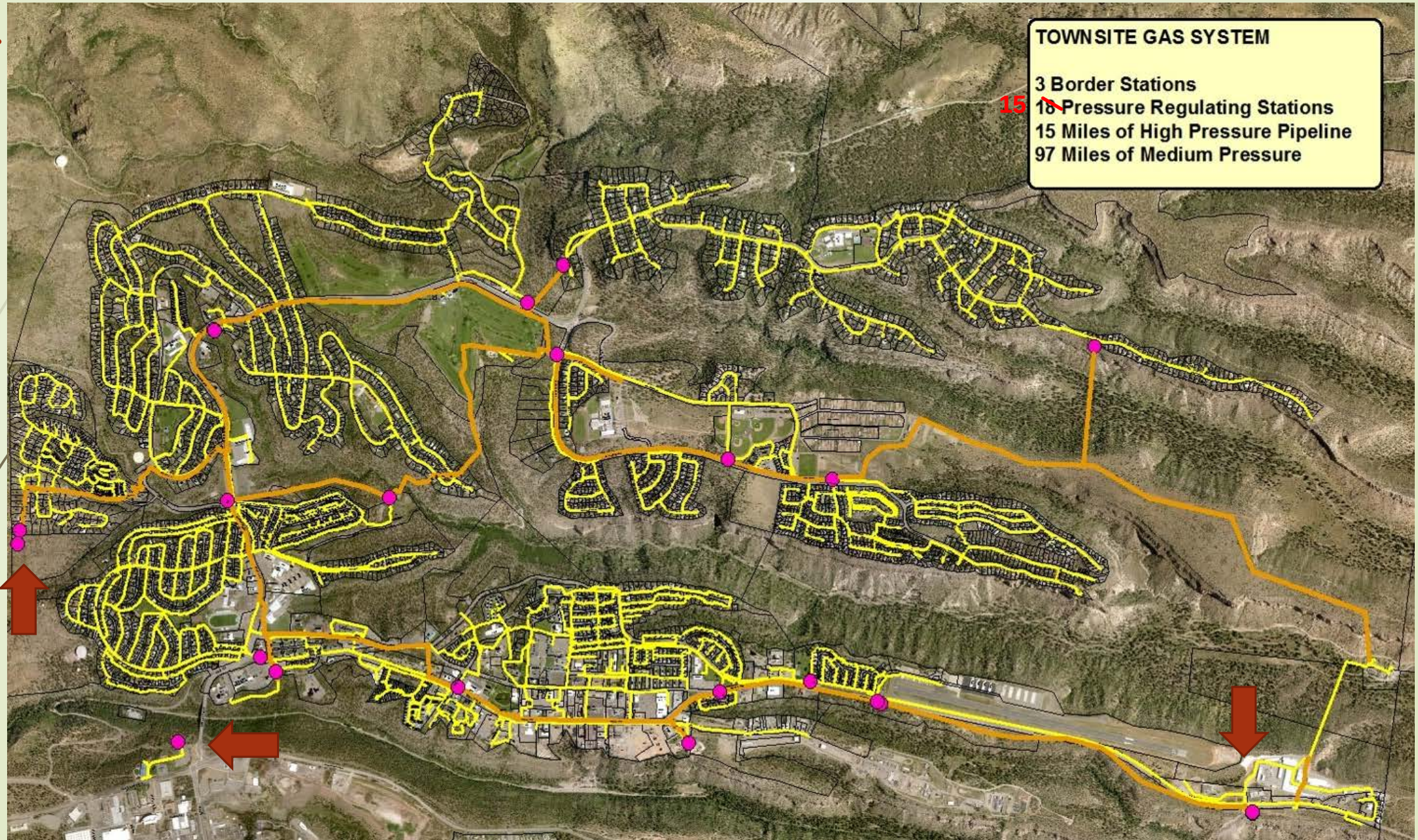
- **Required Annual Reports**
  - Annual O&M Report
    - System Composition {Miles of Mains & Services, Pipe Material Type, Pipe Size, Number of Services}
    - Number of Leaks {with root cause information}
    - Number of Excess Flow Valves
  - Greenhouse Gas Report
    - Amount of Carbon Dioxide (CO2) released into the atmosphere
    - Derived from Unaccounted for Natural Gas Emissions (Losses) (metric tons/year)
- **Operator Qualification Documentation**
  - Typical Activities: Backfill a trench; Leak or Odor complaint investigation; Cathodic Protection inspection and/or maintenance; PRV Station checks and/or maintenance; Meter installation; etc.
    - 80 = Number of "covered activities" for which primary personnel must be "OQ'd"
    - 160 = Number of computer based training & field performance evaluations that need to be passed and documented in order to be "OQ'd" on the 80 covered activities
    - Primary personnel, in addition to being "OQ'd", must be a Journeyman Gas Pipefitter licensed through the State of New Mexico
    - Primary personnel must also be certified in Plastic Welding, Cross Connection Control/Back Flow Prevention, Water Level II & Wastewater Level II Operations and have a CDL-A driver's license (for their other duties in water & wastewater)

GAS, WATER & SEWER (GWS)

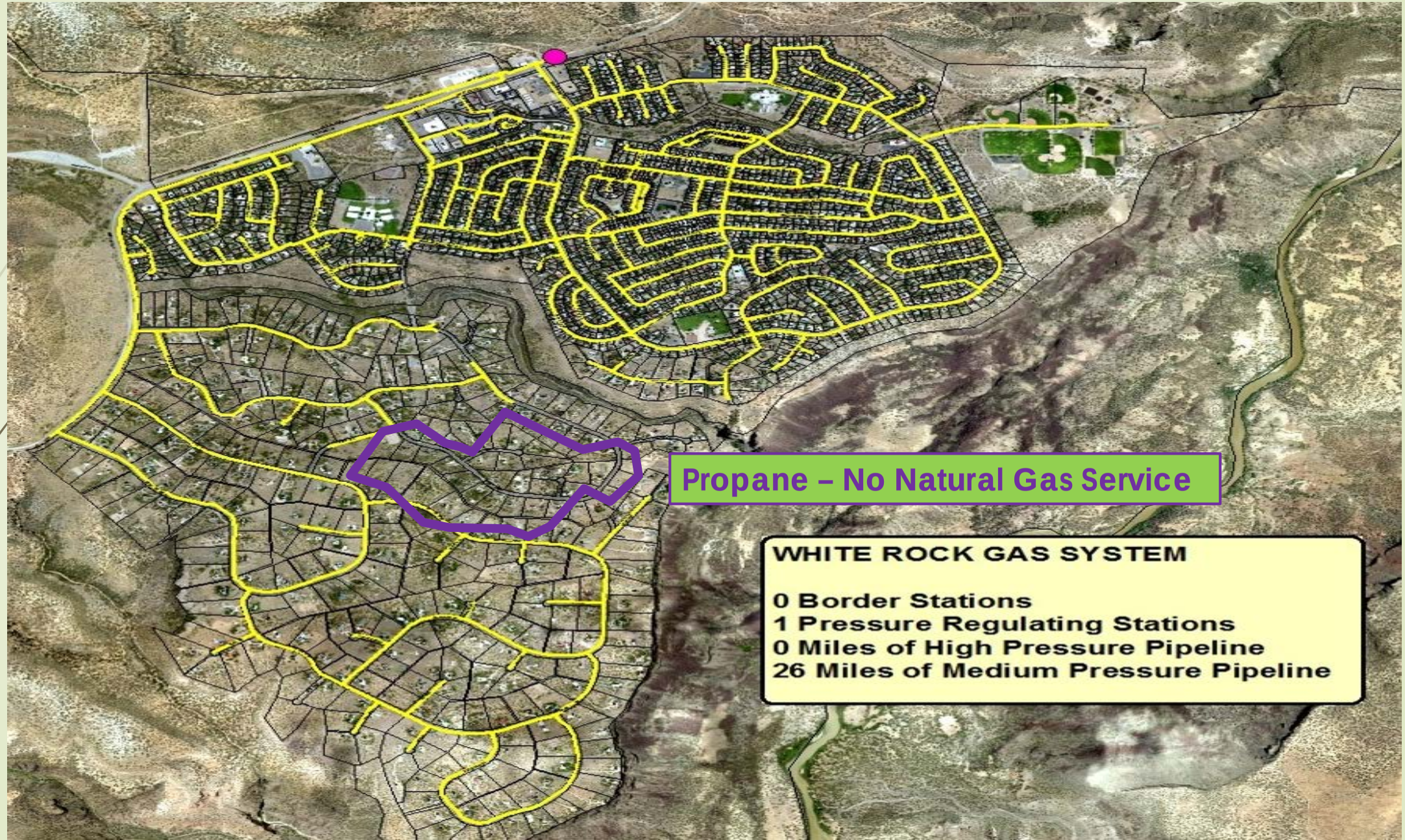
GWS FIELD OPERATIONS - GAS

- Operation & Maintenance of LA and WR Natural Gas Distribution Systems
- FY19 Annual O&M Budget $1,914,232
- FY19 Projected Cost of Gas $2,333,250
- Projected FY19 Return to LAC General Fund $254,125
- 9 Licensed Journeyman Gas Pipefitters
- 8,498 Customer Accounts

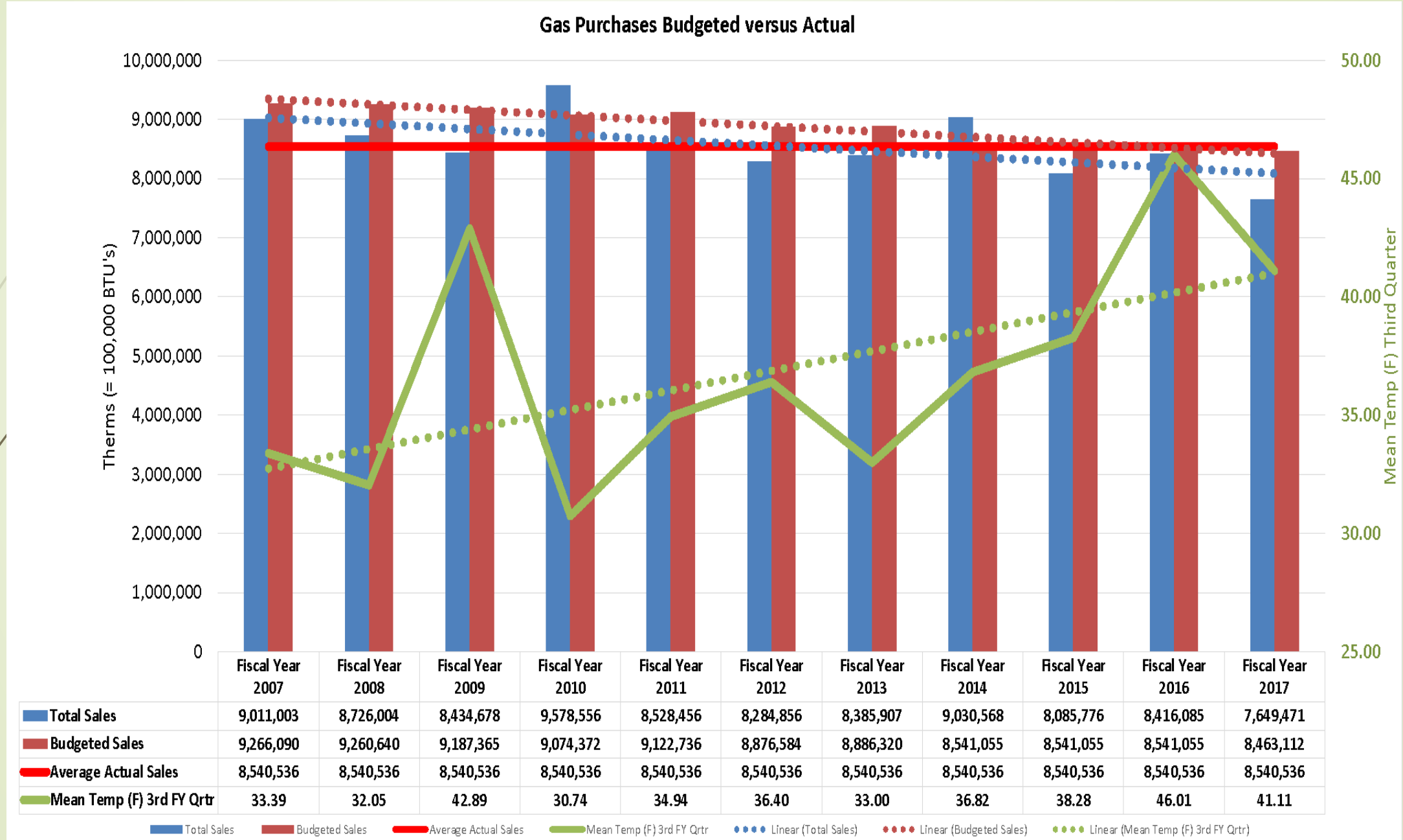
Los Alamos Townsite Gas Distribution System



White Rock Gas Distribution System



Gas Distribution System Budgeted versus Actual Gas Purchases – 2007 Thru 2017



	Fiscal Year 2007	Fiscal Year 2008	Fiscal Year 2009	Fiscal Year 2010	Fiscal Year 2011	Fiscal Year 2012	Fiscal Year 2013	Fiscal Year 2014	Fiscal Year 2015	Fiscal Year 2016	Fiscal Year 2017
Total Sales	9,011,003	8,726,004	8,434,678	9,578,556	8,528,456	8,284,856	8,385,907	9,030,568	8,085,776	8,416,085	7,649,471
Budgeted Sales	9,266,090	9,260,640	9,187,365	9,074,372	9,122,736	8,876,584	8,886,320	8,541,055	8,541,055	8,541,055	8,463,112
Average Actual Sales	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536	8,540,536
Mean Temp (F) 3rd FY Qrtr	33.39	32.05	42.89	30.74	34.94	36.40	33.00	36.82	38.28	46.01	41.11

2005 Condition Assessment Accomplishments - 1 of 2

- **Pre-2005 Condition Assessment Pipeline Replacement Accomplishment Highlights**
  - 12,000 linear feet of high pressure & 10,000 linear feet of medium pressure pipeline replaced
    - Corroded bare steel pipeline replaced with polyethylene pipe
    - Undersized pipelines replaced for improved service pressure & volume
    - New feeder lines for redundant or enhanced service pressure & volume
- **Pre-2005 Condition Assessment White Rock Sectionalizing Valve Installation Accomplishment Highlights**
  - 12 sectionalizing valves were installed at 10 locations throughout the La Senda & Pajarito Acres area
- **Post-2005 Condition Assessment Pipeline Replacement Accomplishment Highlights**
  - 62,000 linear feet of high pressure & 24,000 linear feet of medium pressure pipeline replaced
    - Corroded bare steel pipeline replaced with polyethylene pipe
    - Undersized pipelines replaced for improved service pressure & volume
    - New feeder lines for redundant or enhanced service pressure & volume

2005 Condition Assessment Accomplishments - 2 of 2

- **Post-2005 Condition Assessment Antiquated Large Meter Set Replacement Accomplishment Highlights**
  - 33 antiquated large meter sets identified in the 2005 Condition Assessment have been replaced
  - 5 major user meter sets to serve expanded facilities have recently been replaced
  - 15 large meter sets had a correction factor error corrected
  - A program of annual large meter checks has been instituted
- **Post-2005 Condition Assessment Pressure Regulator Station Accomplishment Highlights**
  - 7 obsolete or redundant pressure regulator stations have been removed from service
  - 16 separate gas “districts” have been reduced to 5 “districts
  - All single feed “districts” have been eliminated
- **Post-2005 Condition Assessment Isolated Services Elimination Accomplishment Highlights**
  - 500+ isolated steel meter set risers have been eliminated (PHMSHA requirement)
  - 5 years of a phased CIP program using in-house GWS personnel
- **Proposed 2019 Condition Assessment Update**
  - Update the Gas System Hydraulic Model & Planning Analysis
  - Identify System Deficiencies & Capacities

Typical Pressure Regulating Station Photos

Ongoing Strategy for Operating and Maintaining the Gas Distribution System

- **INPUT #1 - Condition Assessment (Latest = 2005; Next Scheduled 2019)**
- Provided a 2005 in-house condition assessment of the gas distribution system. Significant items highlighted included:
  - Steel Pipe versus Polyethylene (PE) Pipe – Extent of corroded steel pipe
  - Isolated Steel Service Meter Risers – Needing replaced or upgraded to meet regulatory requirements
  - PRV Stations (Pressure Regulating Stations) – Needing upgrades to meet regulatory requirements
  - System Capacity – Location of areas served by under capacity pipelines or single feeds
  - Meters (Condition and Proper Size) – Large service customer regulator & meter age, condition and proper size
- Provided Historic Recent Improvements
- Recommended Possible Future Improvements
- **INPUT #2 - Asset Management Team (AMT) Program**
- A team effort consisting of front line supervisors (with daily input from field crews), engineering and finance & admin staff to programmatically address O&M and capital replacement requirements and system upgrade opportunities
- Identify and prioritize portions of the gas system that need attention in order to provide safe and reliable gas service to our customers
- AMT program features quarterly meetings plus one additional pre-annual AMT Governance Team meeting
- **OUTPUT - Bi-Annual Budget / Annual Budget Update & Revision / Quarterly System Condition Assessment (Field & Financial)**
- AMT recommends annual O&M budget to meet gas system requirements
- AMT recommends capital improvement projects (CIP) based on condition analyses and DPU priorities and objectives
- Supplies system data for making informed strategic planning decisions and developing annual action plans

Examples of Operation & Maintenance Program Efficiency – 1 of 2

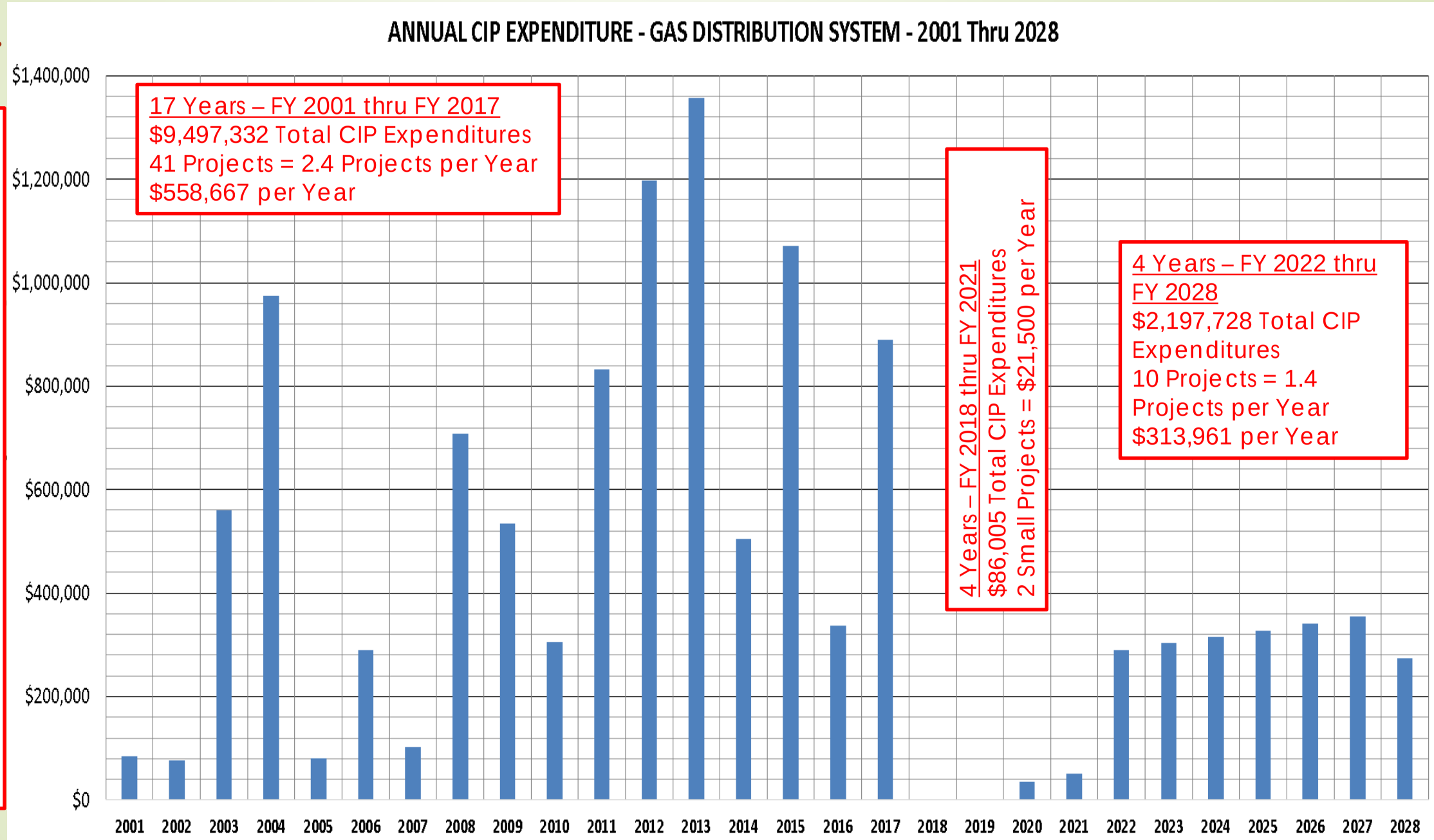
- **Eliminating PRV Stations (slowly over the past 15 years)**
  - New or re-purposed pipelines enable this to occur
    - Reduces the number of PRV stations needing O&M
    - Reduces the number of "districts" needed to be individually serviced and documented
    - Improves the reliability of the system by ensuring every "district" has more than one PRV station feeding gas into that "district"
- **Switching from a Paper File Based to a Computer Based Operator Qualification (OQ) Administrative System**
  - The GWS supervisory team is responsible to ensure that all personnel are current and "OQ'd" for every assigned activity
  - Each individual field crew member is responsible for ensuring they are current and "OQ'd" for all activities required in their job descriptions
  - OQ training & testing is required every few years (varies depending on the activity being "OQ'd")
  - The computer based testing and tracking program now used is extremely efficient in tracking not only in-house DPU personnel but also in tracking private contractor personnel's OQ qualifications
  - The computer based system also offers easy access to computer based training, testing and documentation storage for each individual field crew member as well as access by the supervisory team
- **Incorporating GIS More as an O&M Tool in Addition to Being the Standard Mapping Tool**
  - Will provide for easier and quicker access to gas system regulatory documentation by adding field form data to the GIS data sets either by attaching scanned images of the field forms or inputting the field form data into a GIS data set
  - Will provide for easy access to records during regulatory State PRC audits – thereby reducing audit time and perceived record keeping weaknesses by the auditors and reducing the number of regulatory violations that must be responded to
  - Enhanced field forms matched to PHMSHA regulations and to upgraded GIS data sets have been developed, tested and implemented
  - GIS gas system O&M tool initiation is scheduled for late in FY 2018

Examples of Operation & Maintenance Program Efficiency – 2 of 2

- **Incorporating a Comprehensive Department Wide Compliance Calendar to Track Regulatory Deadlines**
  - Provides monthly updates and reminders of when regulatory required activities are due
- **Improved Communication, Understanding and Cooperation with LAFD**
  - Improved levels of understanding and standard policies and procedures relating to federal regulatory requirements placed on the gas distribution system operators as these relate to LAFD policies and procedures when responding to gas leak and odor complaint calls from customers
  - Revised fire hydrant testing policy so that LAFD coordinates with GWS to provide for DPU operation of water valves and hydrants during hydrant testing to minimize water hammer damage to existing pipelines
- **Gas Distribution System Condition Assessment – Continuous Improvement**
  - Updated system wide gas distribution system condition assessment project is scheduled for FY 2018
  - An outside consultant with gas system experience will be contracted with for this effort
- **Gas Distribution System Modeling – Continuous Improvement**
  - Updated gas distribution system condition assessment is scheduled for FY 2019
  - An outside consultant with gas system modeling experience will be contracted with for this effort
  - The upgraded GIS gas distribution system data set will be the basis for the upgraded model
  - Update the gas system hydraulic model and perform a planning analysis
  - Identify system deficiencies and system capacities

Gas Distribution CIP Program – FY 2001 Through FY 2028

The difference in annual CIP expenditures between the FY 2001 - FY 2017 period and the FY 2022 - FY 2028 period is the aggressive 2001 – 2017 CIP program has essentially finished bringing the gas system up to an acceptably modern standard. Future gas system CIP projects are planned as more routine R&R/O&M type of projects.



CIP Program - Gas Distribution System

HISTORIC CIP EXPENDITURES

- Pipe Replacement/Capacity Expansion Combination Projects - $5,127,669
- Pipe Replacement Projects – Corroded or Other Deficient Pipe Material Replacement - $1,574,528
- System Capacity Expansion Projects – New or Vastly Expanded Pipe Size Installation - $1,350,505
- Steel Riser Replacement Project – Regulatory Requirement – 5-Year Phased Project – Apx. 600 Riser's Replaced - $857,321
- Other Projects – Service Extensions/Upgrades, PRV Station Upgrades, Routine R&R - $587,310

FY 2018 – FY 2022 PERIOD CIP EXPENDITURES

- Minimize CIP Expenditures - $86,005 {AMI O&M Project = $1.8 million / projected date within this period}

PROPOSED FUTURE CIP EXPENDITURES

- SCADA Initiation for Pressure and Point of Entry Flow Metering – O&M Efficiency Improvement - 3-Year Phased Project - $100,000 +/- per Year (FY 2022 – FY 2024)
- PRV Station Enclosure Upgrades – Regulatory Requirement for Protection from Damage – 3-Year Phased Project - $200,000 +/- per Year (FY 2022 – FY 2024)
- White Rock Sectionalizing/Key Valve Installation – O&M Efficiency Improvement/Regulatory Requirement Combination - Multi-Year Phased Project - $350,000 per Year (FY 2025 – FY 2028)
- Typical Routine Repair & Replacement (R&R) Projects - $250,000 per Year Projected Future Out Years

Examples of CIP Program Efficiency – 1 of 2

- **El Gancho PRV Station Elimination (FY 2016)**

- Original CIP project was to replace 850 feet of steel pipeline with polyethylene pipe to continue the program of removing steel pipe from the system and to feed the El Gancho PRV Station. After inspection of the steel pipeline condition, the final project was to eliminate the El Gancho PRV station and pipe through straight into the Barranca Mesa gas distribution system "district" without replacing the old steel pipeline. Provide upgraded cathodic protection measures to the steel pipeline.
  - Cost of project was reduced from an estimated $200,000 to a final cost of $30,000
  - Allowed for the Barranca Mesa "district" to be combined with the larger golf course area "district"
  - Resulted in an additional feed into the new larger combined "district" from both directions providing for improved reliability for customers of both of the original smaller "districts"

- **Quemazon "District" PRV Station Addition (FY 2018)**

- Original CIP project, recommended in the 2005 Condition Assessment document, was to add a second gas line feed from either the Urban Drive or Sandia Drive area of North Community. DPU Engineering staff submitted a proposal to the AMT suggesting replacing this pipeline project with a new PRV Station installation to feed the Quemazon "district" at a lower cost. To further reduce the cost of this project, the AMT team decided on re-using gas valves and appurtenances still in good condition from recently eliminated PRV Stations across the system. The AMT team approved these suggestions and the project is scheduled for FY 2018.
  - Cost of project was reduced from an estimated $250,000 to an estimated final cost of $78,000
  - Provides the second feed into the Quemazon "district" recommended in the 2005 Condition Assessment document

- **SCADA Initiation for the Gas Distribution System – System Pressure and Entry Station Flow Metering (FY 2022 thru FY 2024)**

- Original CIP project was to add HSQ type SCADA throughout the gas distribution system in order to both record system pressures, as required by regulation, and to provide immediate auto-alerts when an alarm situation occurs. DPU Engineering staff submitted a proposal to the AMT suggesting a new cell based SCADA system at a lower cost. The AMT team approved of this suggestion and the project has been deferred until FY 2022.
  - Cost of project was reduced from an estimated $750,000 to an estimated final cost of $300,000

Examples of CIP Program Efficiency - 2 of 2

- **Barranca Mesa Steel Pipeline Replacement Program Elimination (FY 2018 – FY 2025)**

- Original CIP project, as recommended in the 2005 Condition Assessment document, was an 8 phase project to replace all 68,500 feet of steel main & service pipeline in the Barranca Mesa area with polyethylene pipe to continue the historic program of removing steel pipe from the system. DPU Engineering staff submitted a proposal to the AMT suggesting that the actual condition of the steel pipelines (based on up to date inspections) are acceptable provided that a renewed emphasis on the cathodic protection program was implemented. The cathodic protection program has been enhanced and the AMT team approved this suggestion.
  - Cost of project was reduced from an estimated $5,300,000 CIP to a final cost of a difficult to quantify estimated $30,000 +/- in additional annual O&M expenditures in both the GWS and Engineering divisions
  - Resulted in the continued existing level of service to the Barranca Mesa customers using steel pipelines with a cathodic protection program consistent with national standards

- **White Rock Steel Pipeline Replacement Program Elimination (FY 2026 – future FY's)**

- Original CIP project, as recommended in the 2005 Condition Assessment document, was a multiple year phased project to replace all 169,000 feet of main line and 95,000 feet of service line steel pipeline with polyethylene pipe to continue the historic program of removing steel pipe from the system. The actual condition of the steel pipelines (based on up to date inspections) was found to be acceptable provided that a renewed emphasis on the cathodic protection program was implemented. The cathodic protection program has been enhanced and the AMT team approved this suggestion.
  - Cost of project was reduced from an estimated $20,000,000 to a final cost of a difficult to quantify estimated $30,000 +/- in additional annual O&M expenditures in both the GWS and Engineering divisions
  - Resulted in the continued existing level of service to the White Rock area customers using steel pipelines with a cathodic protection program consistent with national standards

Typical Gas Distribution Pipeline Inspection Project Photos

Steel Pipeline Replacement with HPDE Pipeline

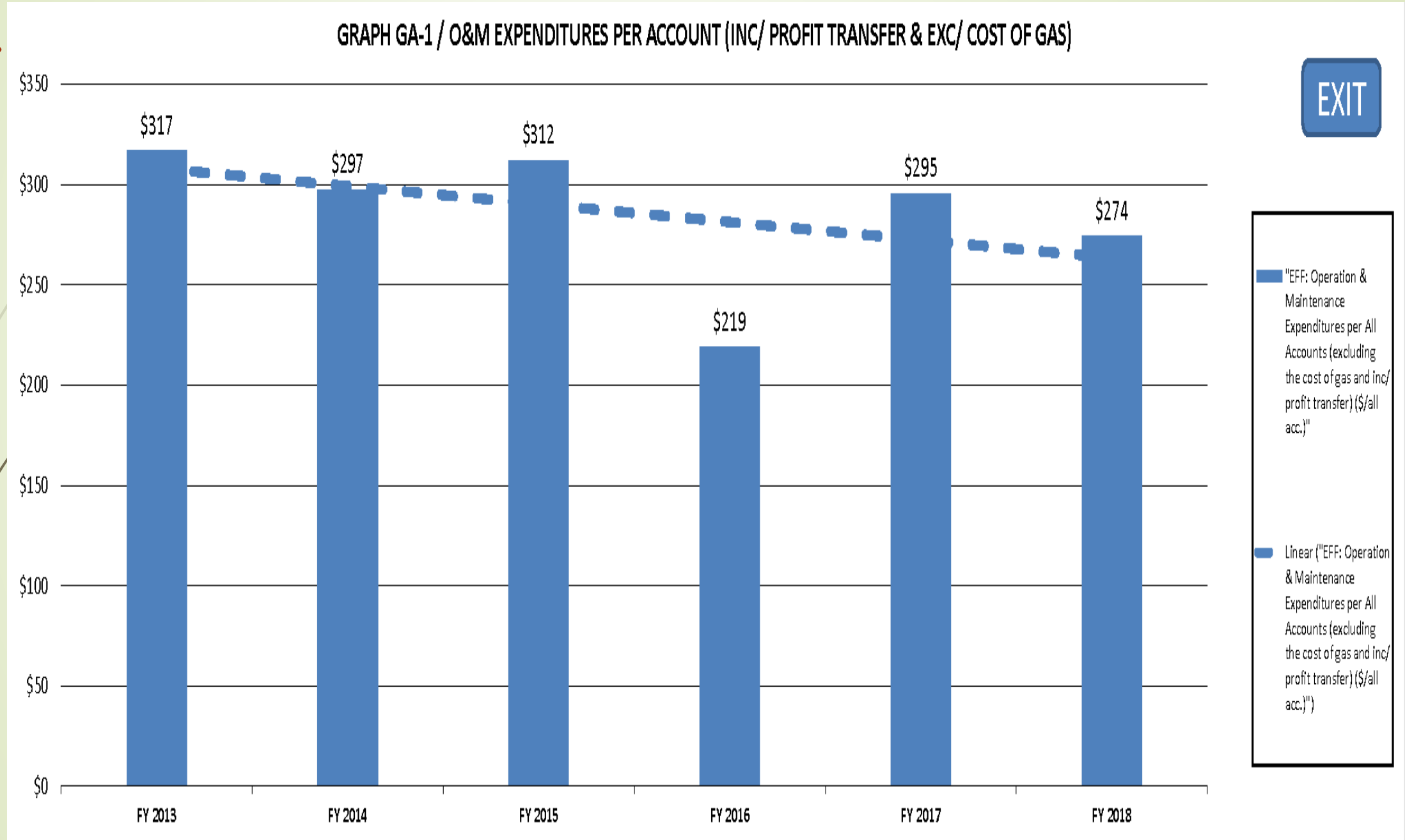
Parallel New HDPE & MDPE Pipelines

Measures/Targets/Benchmarks for Tracking Gas Distribution System O&M

- ❖ **PRIMARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (all)**
- ► **O&M Expenditures per All Accounts (excluding Cost of Gas & excluding Profit Transfer)**
- ► **PHMSA Reportable Main Pipeline Leaks per 100 Miles of Main Pipeline (#/100 miles)**
- ► **Therms per Capita per Heating Degree Day (therms/capita/hdd)**
- ► **Total Therms Delivered (with Heating Degree Days)**
- ❖ **SECONDARY KEY ORGANIZATIONAL PERFORMANCE MEASURES (all)**
- ► **Number of Gas Meters Changed Out & Average Meter Age (Meter Age Data Planned in the Future)**
- ► **Unaccounted for Gas Loss (%)**
- ► **PHMSA Reportable Service Leaks per 1,000 Service Connections (#/1,000 serv. conn.)**
- ► **O&M + Cost of Gas + Profit Transfer Expenditures per All Accounts versus Revenue per All Accounts ($/all acc.)**
- ► **Planned Maintenance as a Percent of Total Maintenance (planned maint. hours/planned + corrective maint. hours) (%)**
- ► **System Renewal and Replacement (CIP Expenditures for R&R/Total Present Worth of GA System) (%)**
- ► **Simple Total System O&M + Cost of Gas + Profit Transfer Expenditures versus Total System Revenue**
- ❖ **PERFORMANCE MEASURE COLOR CODING FOR TARGETS AND BENCHMARKS**
- ► **Performance Measures with known national standards for system comparison are in GREEN (Typically APGA standards)**
- ► **Performance Measures with a DPU Strategic Plan, Conservation Plan or Budget Projection Goal are in Magenta**
- ► **Performance Measures with no national standard or DPU Plan Goal are in Black**

- ► *Monthly dashboard data is collected and reviewed. Monthly data is compiled annually into an Annual Summary Comparison dashboard for multi-year comparison.*

Gas Distribution – Primary Key Organizational Performance Measure



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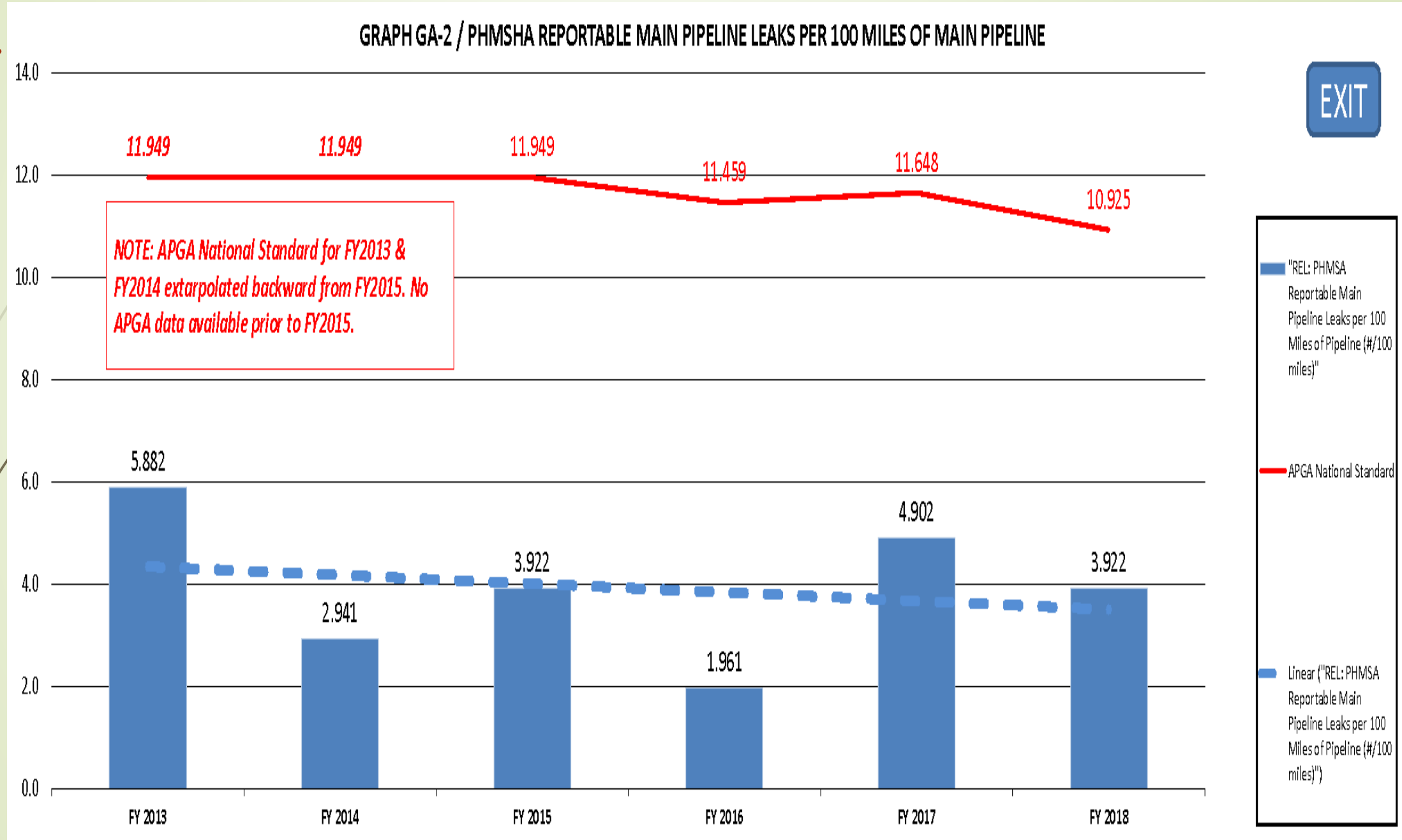

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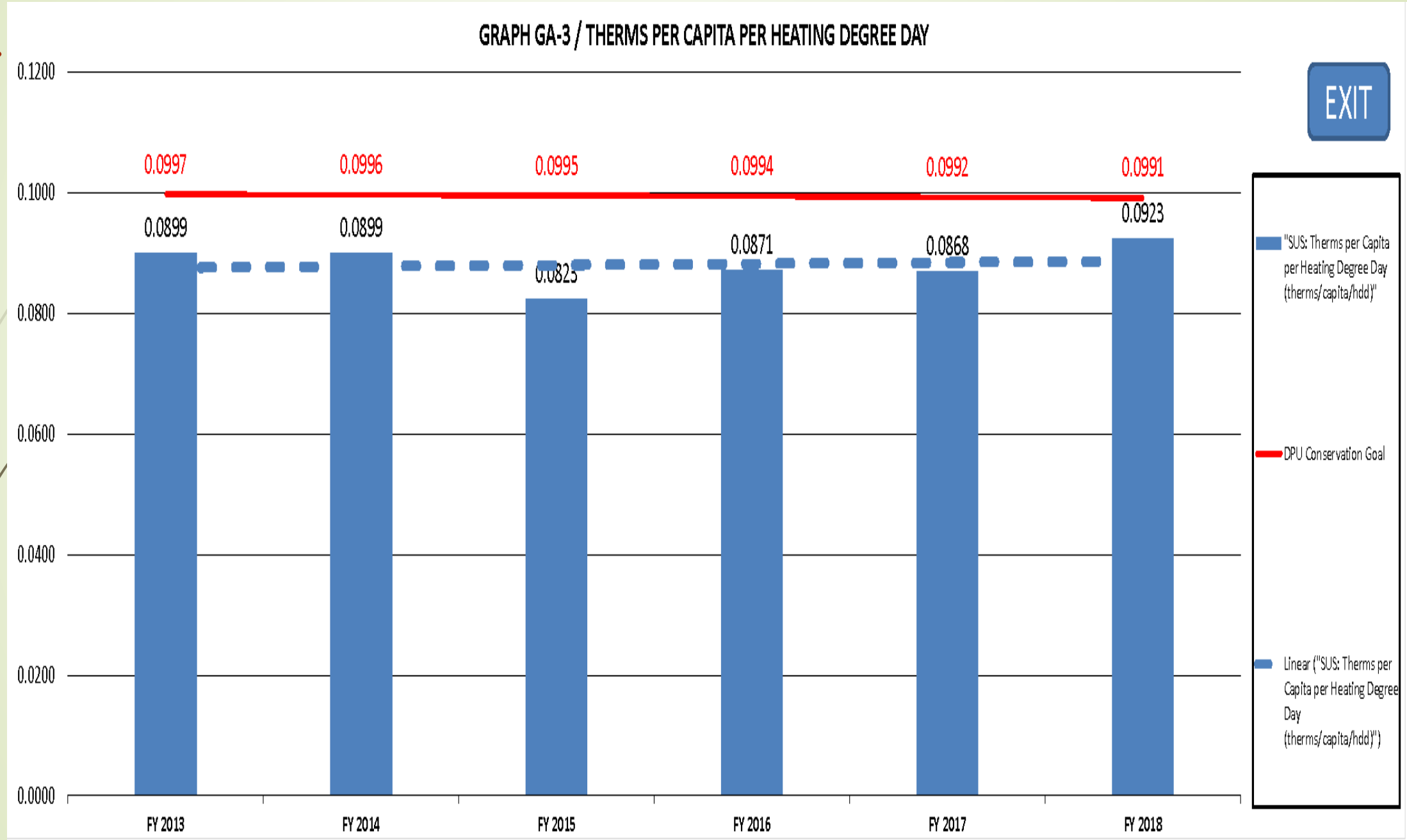

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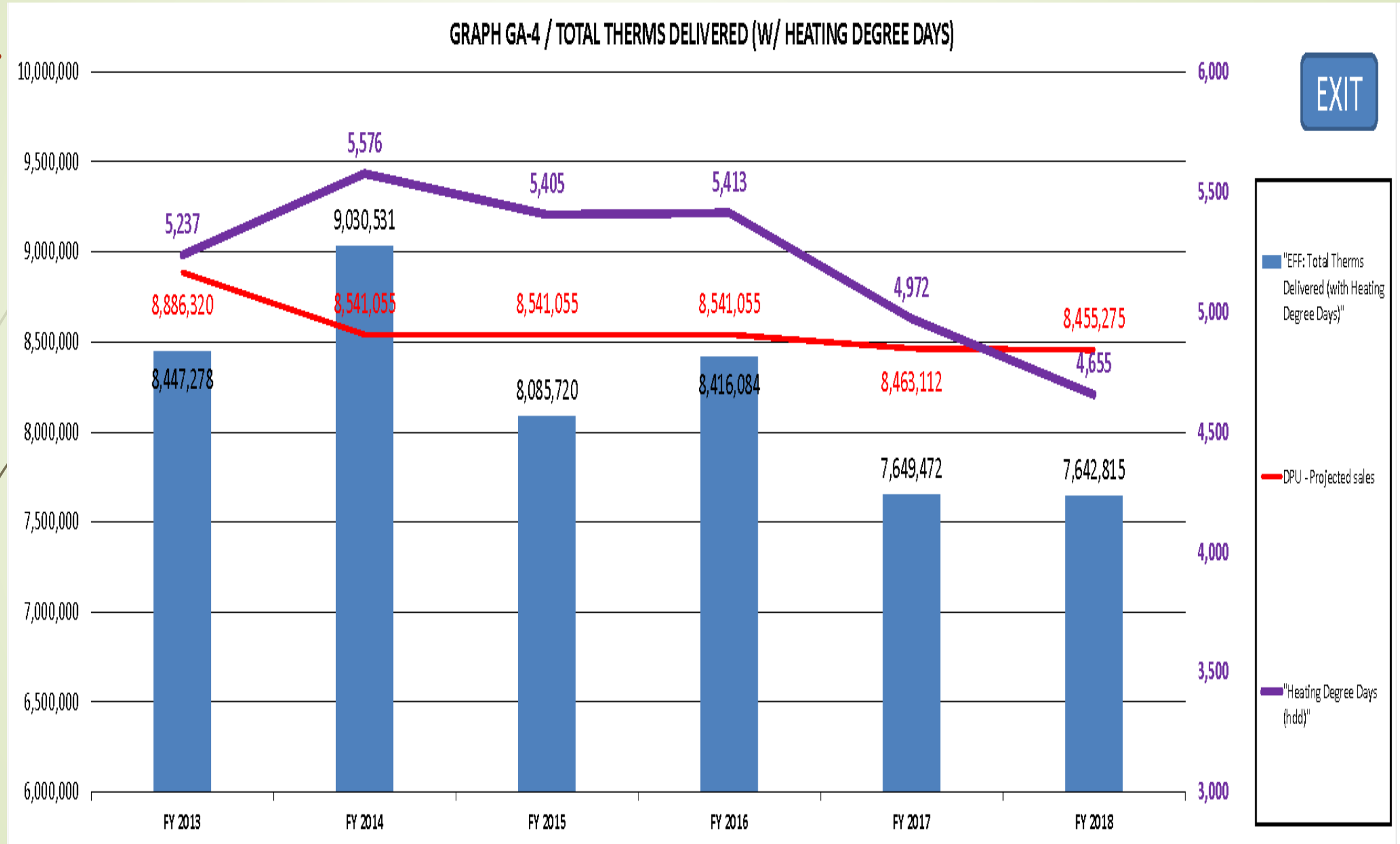
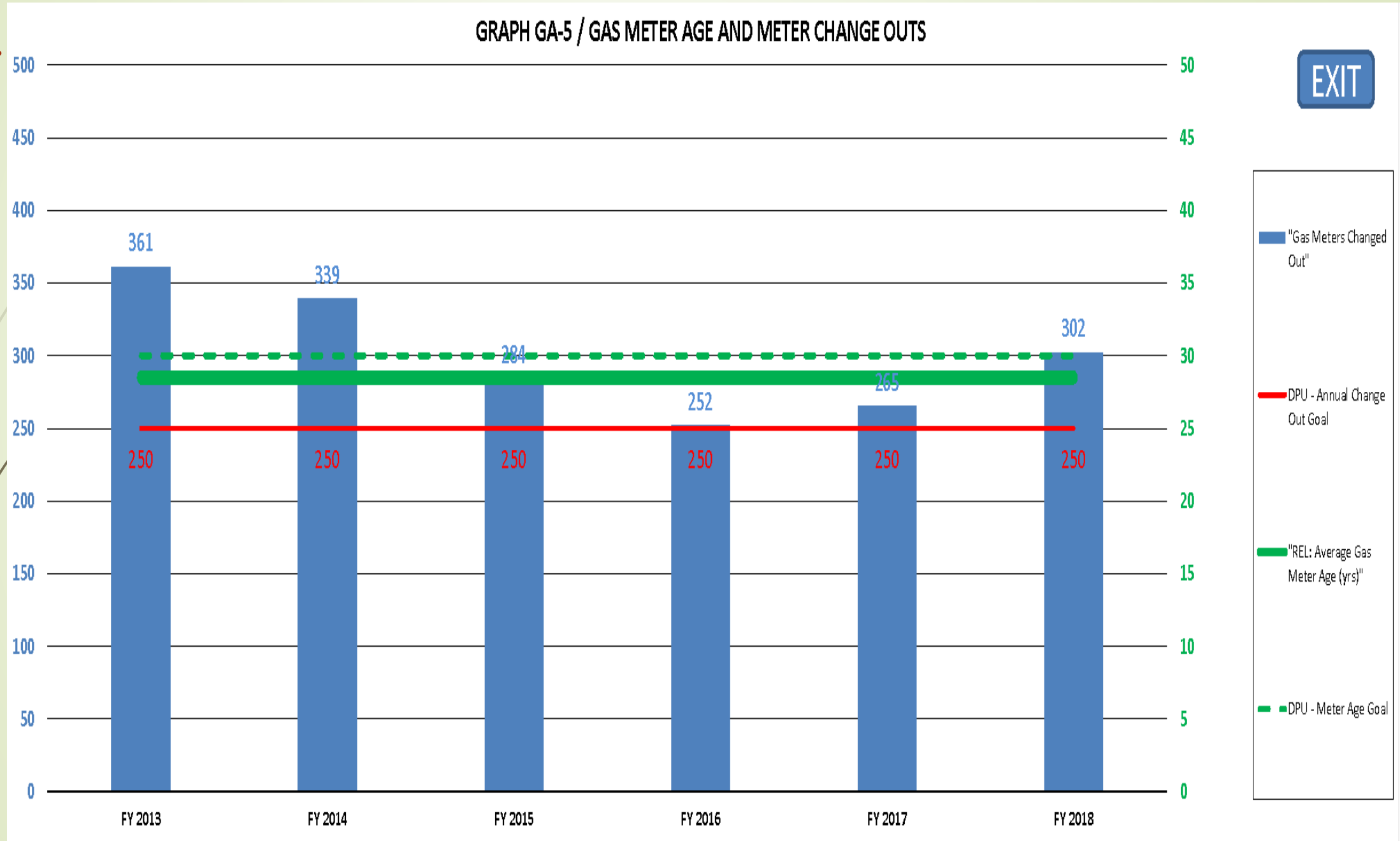


Gas Distribution – Secondary Key Organizational Performance Measure



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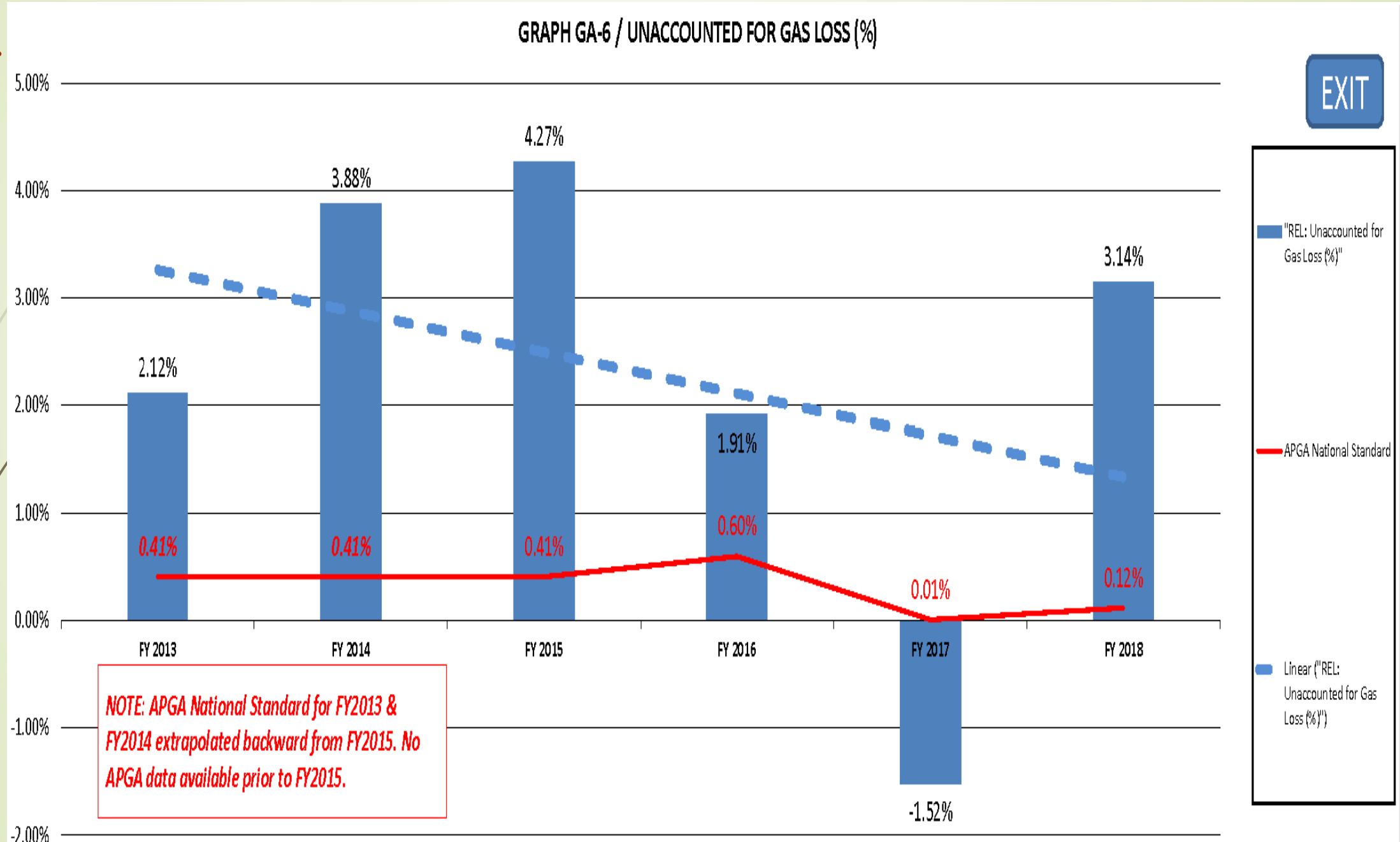

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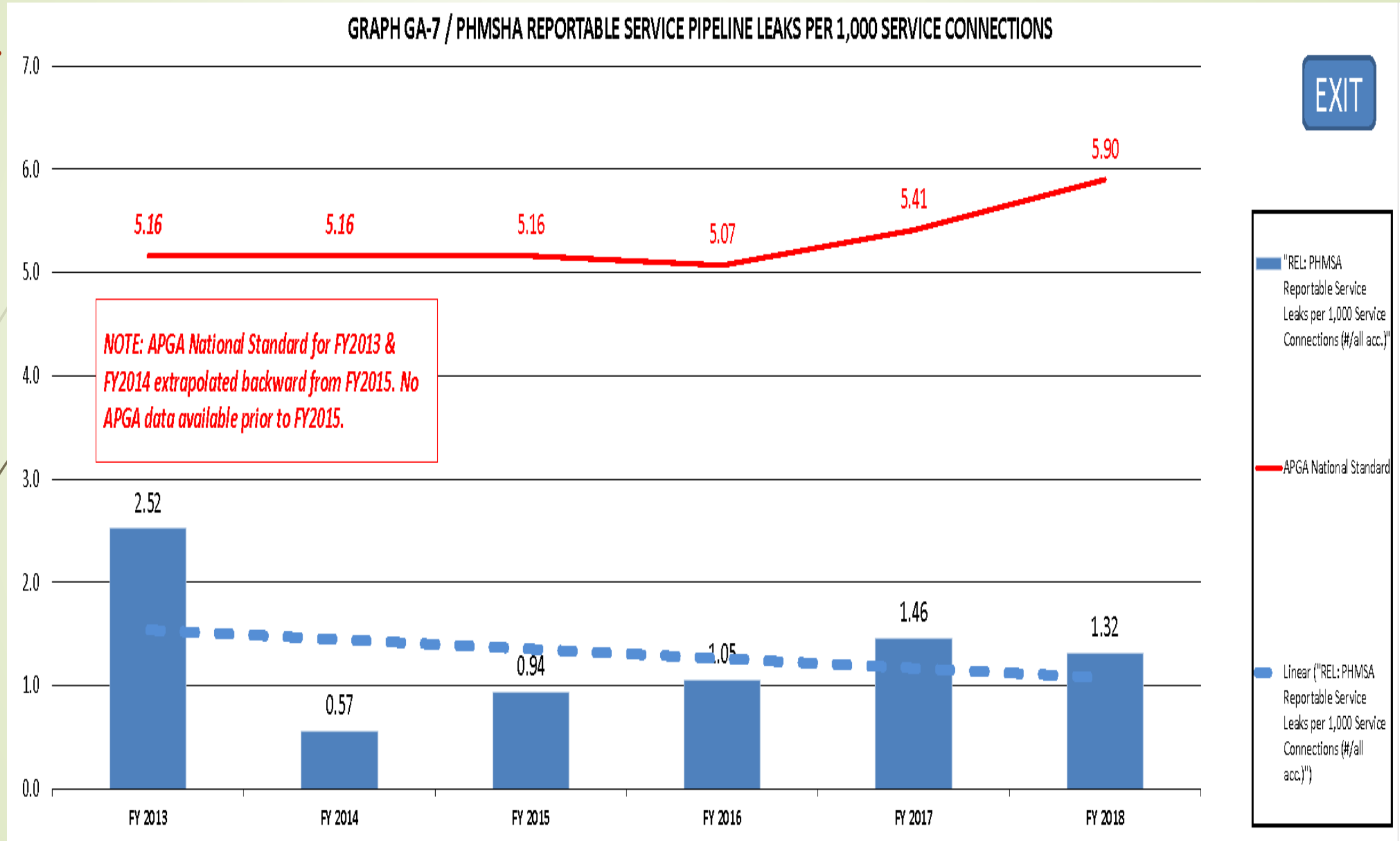

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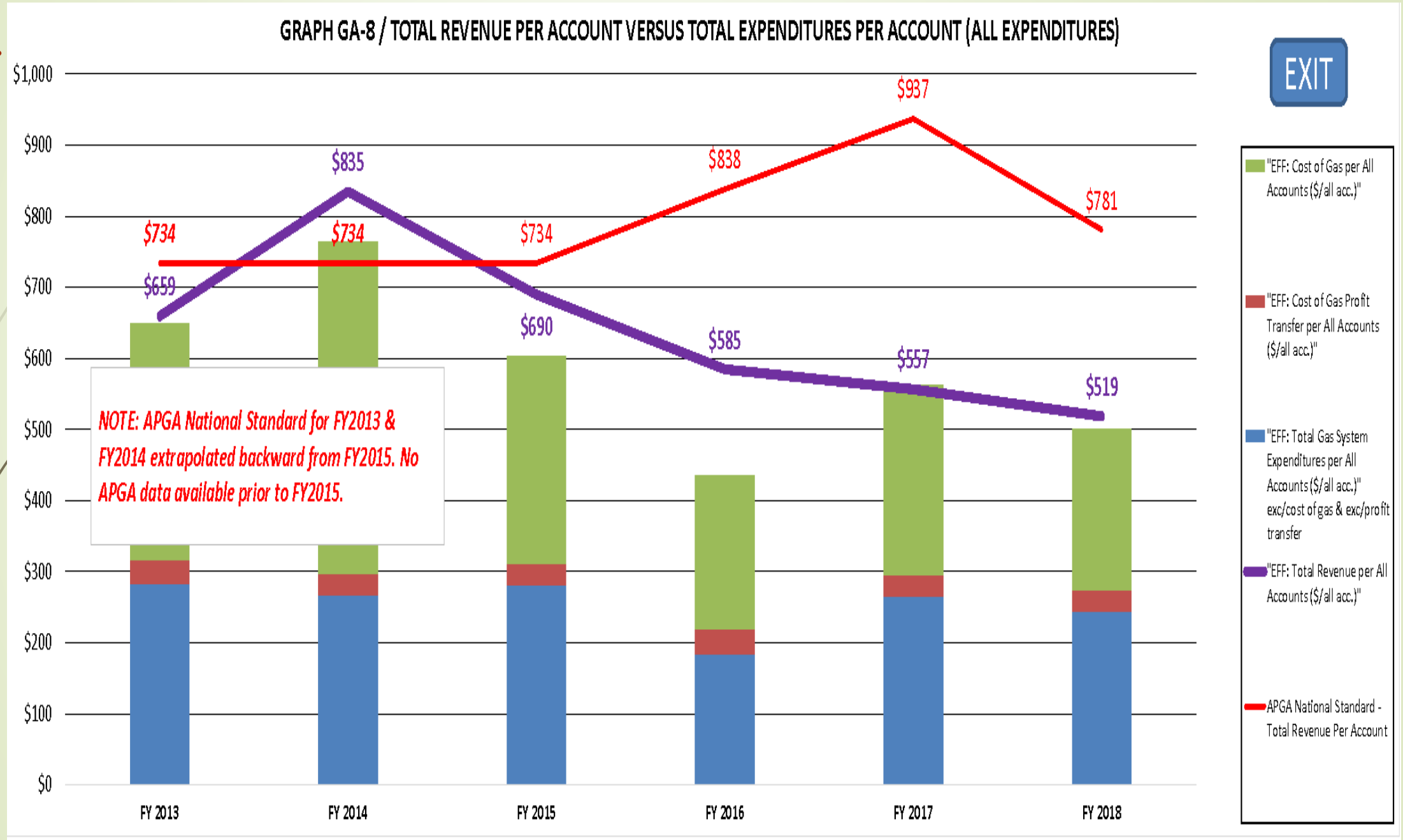

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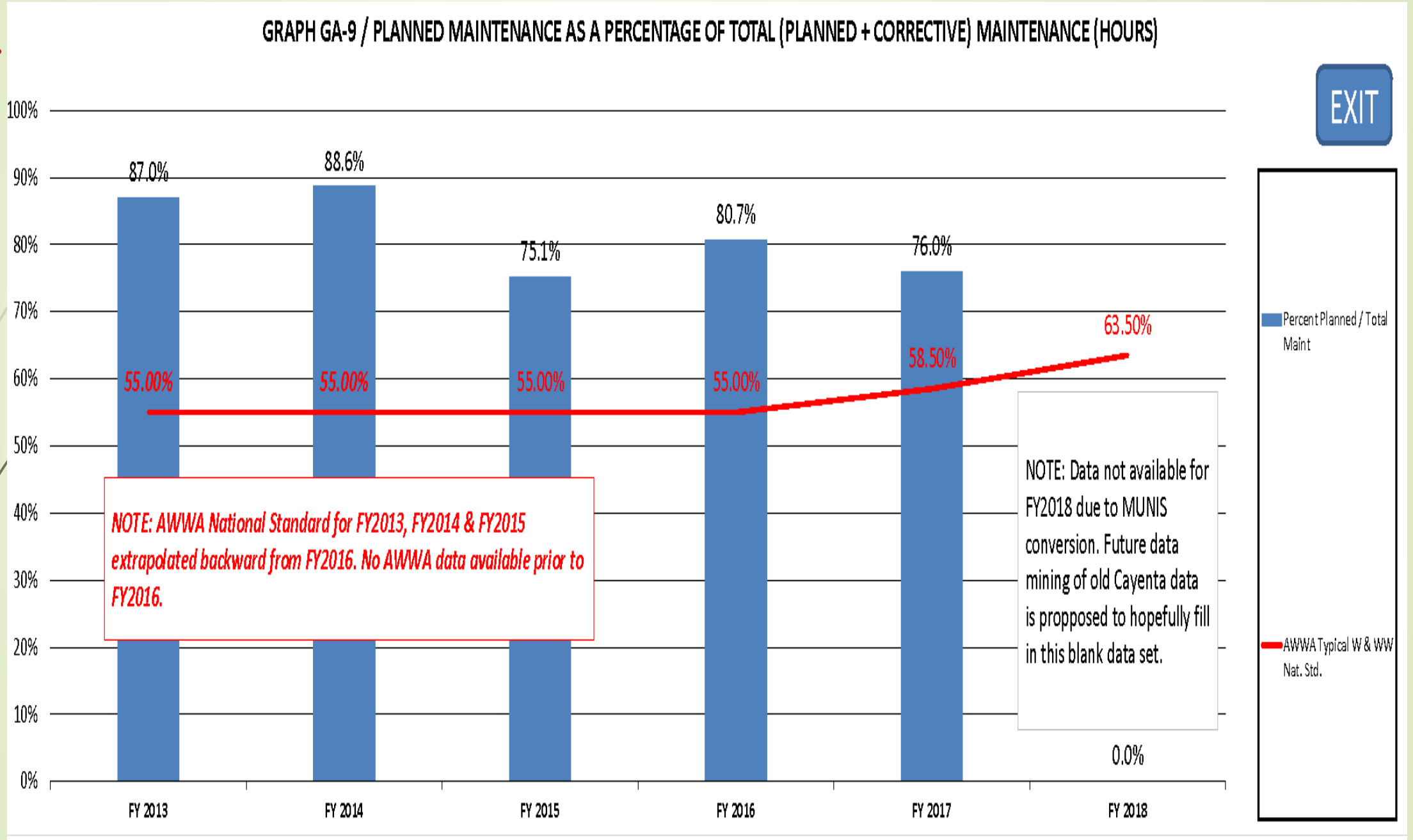

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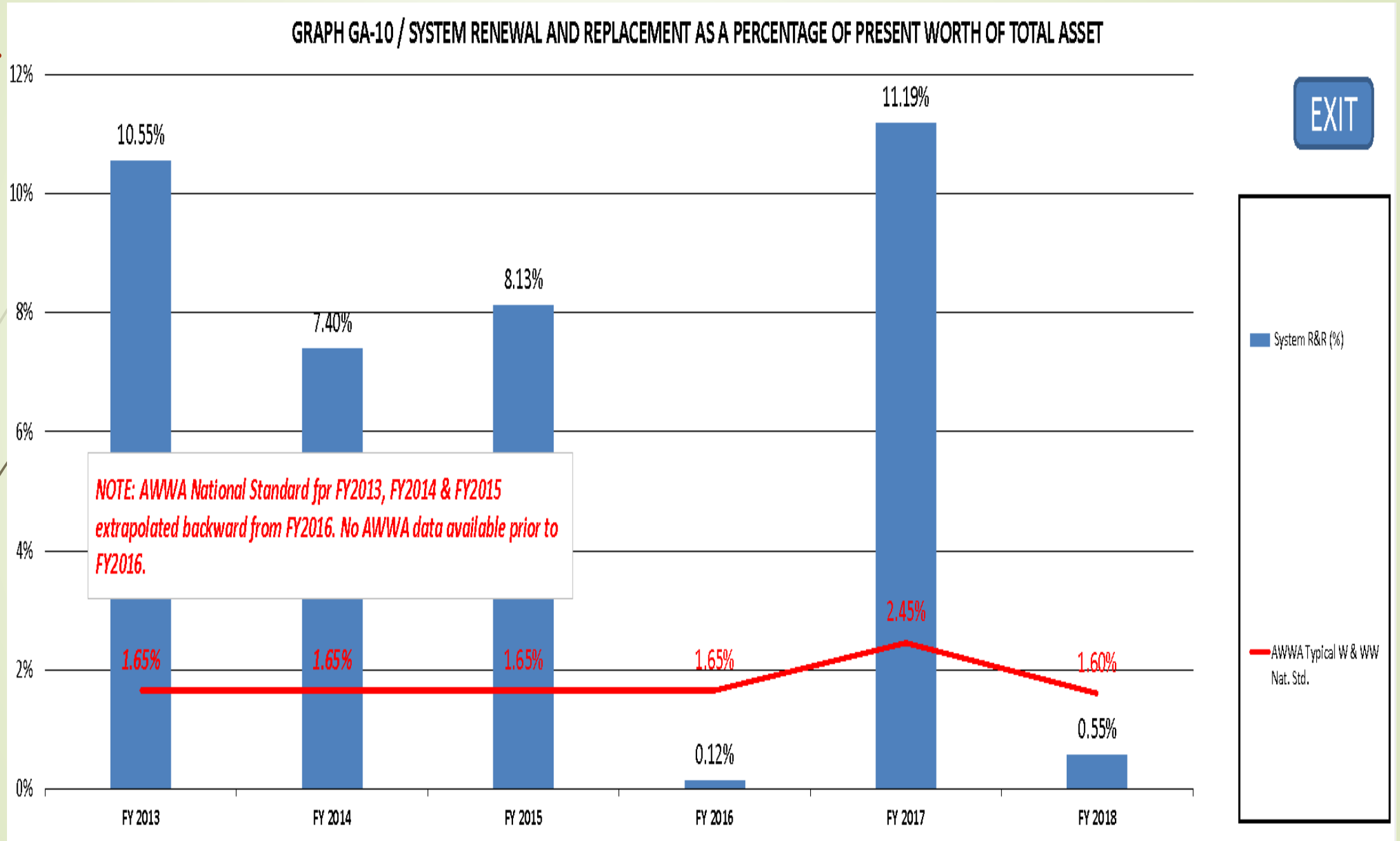

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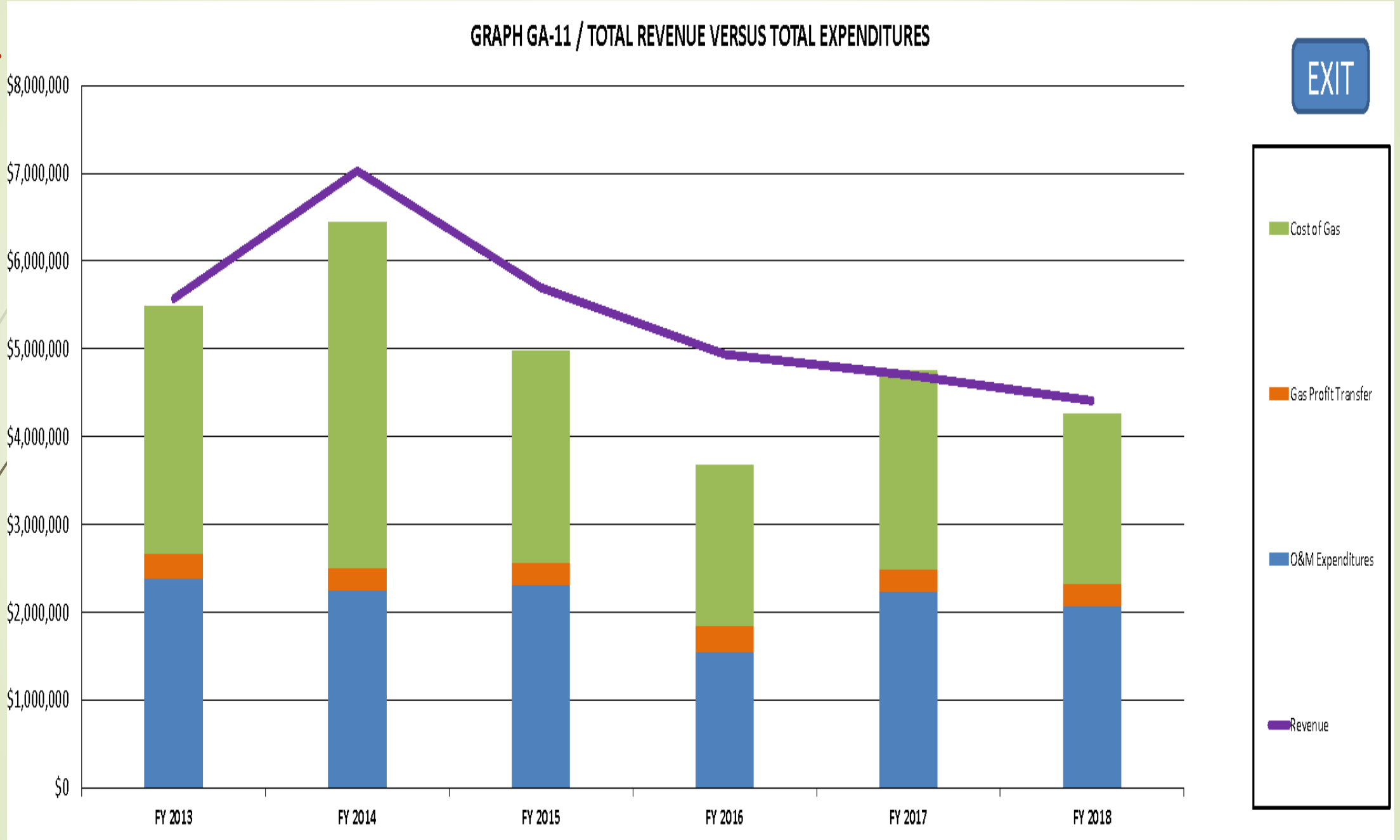
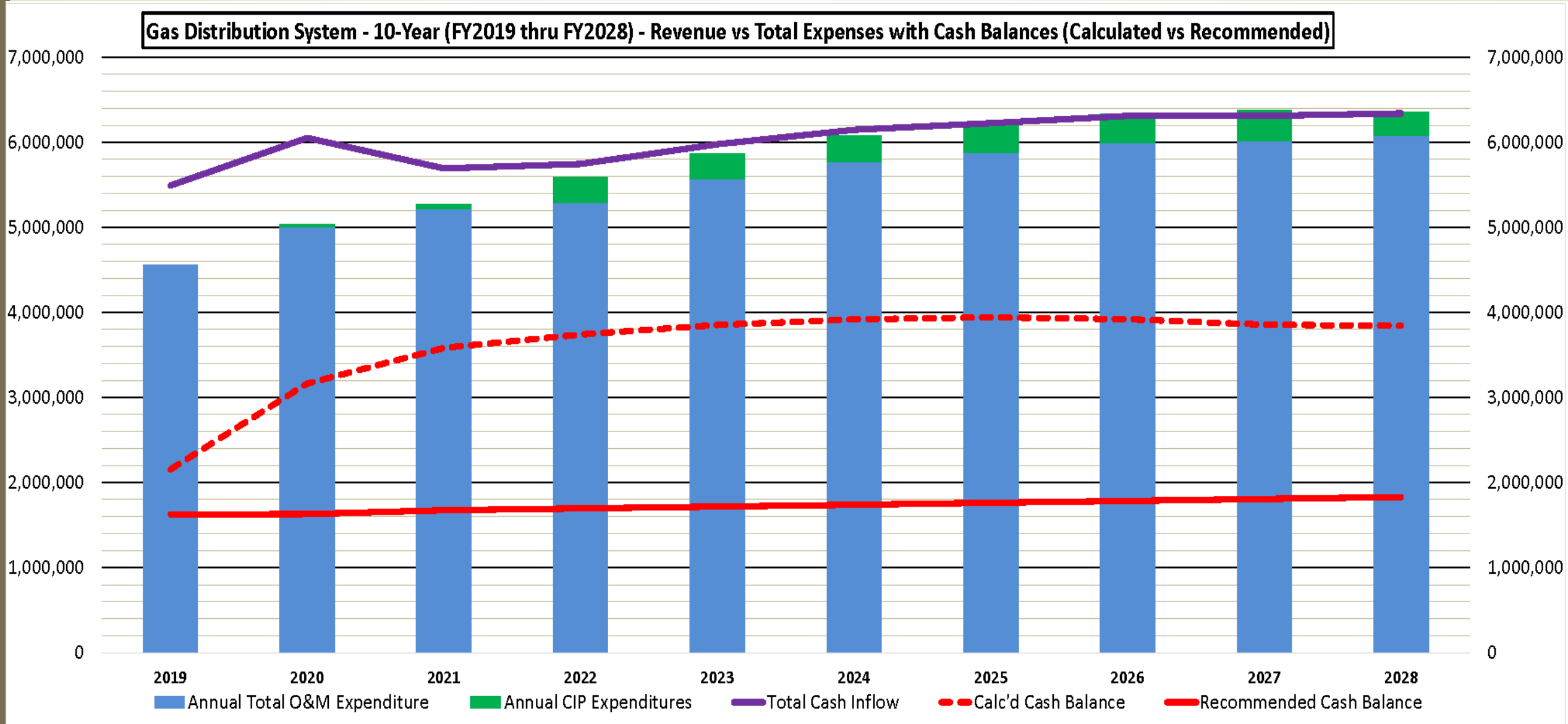


DPU Financial Policy for Cash Reserves

- 180-Days of Budgeted O&M Expenditures Recommended – or – 90-Days Minimum Floor
- Debt Service Reserve (Sufficient to Fund All Debt Service for the Following Year) (Currently = $0)
- Contingency Reserve
  - GA = $250,000 Replace a Major System Component (Pressure Regulating Station, etc)
- Retirement/Reclamation Reserve
  - GA = $150,000 Abandon a Section of Corroded Steel Pipeline or PRV Station
- Actual (or Annuitized) CIP Program Expenditures for the Following Year – or – The System's Annual Depreciation Plus 2.5% (whichever is greater)
  - GA / CIP Based = $2,197,728 (FY22 – FY28) = $313,961 / Year. Compared to $9,886,503 (FY01-FY17) = $581,559 / Year Historic CIP
  - GA / Sys. Dep. Based = 2.5% of $11,830,934 (FY19) = $295,773 / Year

Gas Distribution System / 10-Year (FY19 – FY28) Revenue – Expenditure - Cash Balance Graph



Summary / Conclusions – October 2018 Gas Distribution System – Physical Condition

- The current physical condition of the gas distribution is very good.
- The high pressure "backbone" and much of the medium pressure distribution system have undergone significant upgrades over the last 18 years and all known deficient corroded steel pipe material and undersized mains will have been eliminated at the completion of the NM 502 CIP project scheduled for the summer of 2019.
- All individual "districts" are now fed from multiple sources (no single feed "districts).
- After the NM 502 Project, the gas distribution system will be considered adequate to meet acceptable modern standards for material safety and capacity conditions. Proposed FY 2022 thru FY 2028 CIP projects add SCADA and safety features such that the system will be considered adequate to meet modern standards for operational conditions. Future out-year CIP projects are considered typical R&R or O&M program efficiency enhancement projects.
- The increased emphasis on enhanced O&M activities – as opposed to constant major CIP project completion – has been implemented and progress is evident. Toward the middle of FY 2019, when the first & second phases of the GIS upgrade project have been completed, the enhanced O&M programs of the gas distribution system will take another significant step forward.

Summary / Conclusions – October 2018 Gas Distribution System Financial Condition

- The current financial condition of the gas distribution system is excellent.
- The existing cash balance reserves of the gas distribution system exceed the requirements of the financial policy adopted by the Board of Public Utilities. This is due in large part to the restructuring of the gas rate from a steady state monthly level billing system that required a large cash reserve to provide for gas price fluctuations to a cost-of-gas pass through billing system that does not require as large a cash reserve.
- The expanded cooperation between the GWS, Engineering and Finance & Admin divisions regarding the development, maintenance and use of the 10-Year Forecast model for the gas distribution system, particularly its use in the AMT quarterly and annual meetings, is also a sign of movement toward a more asset management centered program for the gas distribution system.
- All of the aforementioned programs and program expenditures are related to maintaining and operating the gas distribution system in an efficient and effective manner. Furthermore, these costs need to be shared equitably by all customers which benefit from the use of the gas distribution system.
- The current multi-year trend of warmer average temperatures will continue to be monitored closely. If this trend continues then the annual gas sales volume projections will again need to be adjusted downward. The annual exercise of validating gas rates in order to balance expenditures with revenues will continue to be critical with an eye on potentially decreasing gas sales volumes due to continuing changes in the climate.