**Texas GPCD Calculator**

**Applicability**

This BMP is intended for use by all Municipal Water User Groups (“utility”) that want a simple yet consistent way to track water use and number of connections over time and to calculate the GPCD for that use. The calculator uses an Excel workbook format that can be easily utilized by anyone familiar with Excel so that there is no long expensive development effort, no program specific training and regular program updates are not necessary. Extra worksheets can be appended by the utility to serve individual needs. Like all BMPs, the use of the Texas GPCD Calculator is voluntary.

**Description**

The Water Conservation Advisory Council (WCAC) has developed an Excel workbook to enable reporting and archiving water use data and to provide a consistent method of computing GPCD. The workbook is an adaptation of the New Mexico calculator that has been in use for a few years. Significant redesign of the workbook was made in large part based on the experience that New Mexico has had in their implementation. Overall the NM approach does an excellent job of balancing the desire for more detailed water use information against the effort required by water suppliers to generate the data. Basically, the Texas GPCD calculator strikes the same balance and collects the following data:

1. Population split between single-family, multi-family and institutional
2. Water Volumes by year or month with the ability to split the supplied volumes into 8 water use sectors as shown by the chart below.
3. The number of utility water connections can be split for each of the same 8 sectors.

The Texas GPCD calculator includes instructions and links for obtaining population information from the U.S. Census tables. Using the census data a person per connection ratio is calculated that then allows the utility to adjust population numbers between census years based on the change in service connections.

Based on the collected data the calculator computes the sector based GPCD for the three population dependent sectors (single-family, multi-family, and institutional) as well as GPCD for every sector based on total population. The Texas GPCD calculator also provides charts showing the input data and the computed GPCD values. The calculator is simply a tool for reporting water use and displaying and archiving the results. The fact that it is an Excel workbook makes it easy for a water provider to expand the analytical use of the data in whatever manner they might choose such as forecasting future water demand and predicting conservation efficiencies by adding worksheets to their own workbook.

The calculator is currently posted on the WCAC website for review and comment. Expansion of the report information to include other report information currently collected by the TWDB and TCEQ is possible and can be considered.

The first two worksheets in the workbook have limited data entry for the utility:

1. Instructions and Notations – Utility name, contact information and report years
2. Census Data – utility specific population data from US Census

The workbook contains the following instruction and report worksheets which have no data entry and are locked to prevent accidental loss of report information, formulas and formatting:

1. 2000 Census Instructions
2. 2010 Census Instructions
3. Volume & Pop[[1]](#footnote-1)
4. Monthly Performance[[2]](#footnote-2)
5. Reported Data[[3]](#footnote-3)
6. Annual Performance1 above1
7. Reuse1
8. Definition
9. Adding a Year
10. Summary[[4]](#footnote-4)

The fixed worksheets are followed by the data entry worksheets, one sheet for each year labeled using the 4-digit year. These worksheets are unprotected because they are fairly easily replicated but still contain formulas and formatting that should not be changed. All cells highlighted in green contain formulas and special formatting. Data entry should be done only in the white cells. The worksheets for 2010-2013 were constructed by applying an adjustment factor to earlier worksheets in order to create a better set of test data for the calculator. Every cell in these worksheets contains a formula but the white cells can be overwritten with real data. Before overwriting the cells in the last 2013 worksheet, a copy of the worksheet should be made so the utility can preserve the formulas to make projections for future years.

**Implementation**

To utilize the Texas GPCD calculator, the utility should do the following:

1. Enter the utility information in the “Instructions and Notations” at the front of the workbook.
2. Collect and enter the population data in the “Census Data” worksheet in the white cells. The worksheet allows the utility to split the total population between the three types of residences and calculate an occupancy rate for each in the green highlighted cells at the bottom of the sheet. Once an occupancy level is determined based on the census data, that occupancy level will be applied for each meter added or subtracted into the future to make population adjustments. When new census data become available that data will be used to adjust the occupancy levels. If a utility does not have the information to split single-family and multi-family population and connections then a single occupancy level will be applied to both single-family and multi-family households. Starting in 2010, the data sheets contain a purple selection box at the top that allows the utility to elect to use separate SFR and MFR occupancy ratios or use the “average household size” from the Census tables for all private residences. The census data does provide the population for group quarters which are called institutional in the Texas GPCD calculator.
3. Collect the data and populate a worksheet for each year that the utility wants to consider. The current copy of the GPCD calculator has annual data sheets from 2001 to 2011. Any of these sheets can be populated with a utilities’ data. For years with no data simply delete the worksheet for that year. For additional years, new worksheets can be added as explained in the “Adding a Year” worksheet. There is no limit to the number of years that can be captured and archived in the workbook. The reports are built to show a maximum of seven years but the report years can be easily changed by changing the latest report year in cell E31 on the first “Instructions and Notations” worksheet. The utility must decide whether to collect data by month or by year and which of the 8 water use sectors they want to use. Yearly data can be entered for some years and monthly data for others. If yearly data is entered in column D, that data will be used and any monthly data will be ignored. The workbook currently has “annual only” data in years 2001-2004, monthly data in years 2005-2009, then extrapolated data in years 2010-2013.
4. Review data and reports to confirm that the information has been correctly entered and is being displayed correctly.
5. Each year a new data worksheet can be added by following the instructions in the worksheet titled “Adding a Year”. Data entry is minimized by copying the prior year data then adjusting the data for the new year. This allows the user to quickly identify any suspect data that is significantly different from the year before.
6. Add any utility specific worksheets (e.g. future year forecast data) that can be used to generate reports or other conservation information that the utility would like to have making use of the historic data that is contained in the workbook.
7. Contact the TWDB at [WCAC@twdb.texas.gov](mailto:WCAC@twdb.texas.gov) if any help is needed in using the workbook or with any suggestions for improving it.

**Schedule**

Successful monitoring of water conservation is totally dependent on having consistent collection of water use metrics and determination of water conservation results over time using such measures as GPCD. Those utilities that have limited data available should seriously consider developing a strategy to be able to capture the number of connections and water use for all eight water use sectors included in the workbook. Having sector metrics will provide the information that will show the true effect of a utilities water conservation program.

**Scope**

This BMP provides an outline for how a utility can categorize their meters and collect the data so that a better understanding of water uses and seasonal fluctuations can serve to identify the greatest opportunity for water savings.

**Documentation**

Most of the documentation and collection of data is contained within the workbook. As with any digital information, backup copies should be retained. Also, the yearly data worksheets have a space for comment at the top of the page. The space is not limited so all pertinent information that a utility wants to remember about the data collected for that year can be enter and preserved along with the data. Should the utility want to use the data from one or more years in other workbooks, the yearly worksheet(s) can be easily copied to another workbook and the comments will copy with the data.

**Determination of Water Savings**

Every year the utility should estimate its annual water savings. Savings can be estimated based on a GPCD calculation that has been adjusted for population changes that are based on the changes in customer connections. A forecast for future years can be easily created by adding a new worksheet for a future year and populating that data based on the utilities’ water conservation goals and targets. This can be done by entering the desired population and water volume data or, to make it even easier, the worksheets starting in 2010 have been set up with adjustment factors for the number of connections and water volumes in cells K1 and K2 respectively. These factors are applied to the connections and volumes on the sheet identified in cells M1 and M2 respectively to quickly populate the new sheet. This was done to generate additional years of data to better test the calculator but can also be used very effectively to generate forecast data based on water conservation improvement goals. If a utility wishes to populate the sheet with their own generated data the data can simply be entered into the cells which will replace the formula in the cells with data.

By using all eight water use sectors (SFR, MFR, Institutional, Commercial, Industrial, other metered, non-metered and reuse) a utility can best evaluate how the water use has improved year-over-year.

**Cost-Effectiveness Considerations**

A fundamental requisite for implementing any water conservation program is to have a historic record of water use recorded using a consistent set of guidelines and evaluated using a uniformly applied set of metrics. This GPCD calculator represents a very minimal cost by using a readily available program, Microsoft Excel, that requires no in-house software maintenance or upgrades and has the flexibility of accommodating additional evaluating and planning options without the need to modify the historic data. A utility can utilize the calculator to archive historic data for a virtually unlimited number of years and have that information readily available for analysis and planning purposes.

**References for Additional Information**

Link to the GPCD Calculator

**Determination of the Impact on Other Resources**

Having an Excel workbook to record and archive population, water use volumes, service connections and calculate GPCD in a uniform and consistent manner should keep costs to a very minimum. Basic report generation would reduce work in summarizing information and the ability to expand the workbook to include water conservation analysis and goal setting should eliminate any large investments in software development and maintenance. The cost to implement this BMP should be minimal and hopefully staff resources needed to manage the information and generate reports reduced.

**Acknowledgments**

The Texas GPCD Calculator is an adaptation of the New Mexico calculator that has been in use for a few years. Significant redesign of the workbook was made in large part based on the experience that New Mexico has had in their implementation. The New Mexico experience provided invaluable insights into the benefits and shortcomings of their calculator. Implementation issues that they confronted have been addressed in this version. No product of this nature is going to be perfect but the Council is confident that this second generation product is an improvement. Overall the NM approach does an excellent job of balancing the desire for more detailed water use information against the effort required by water suppliers to generate the data. Basically, the Texas GPCD calculator strikes the same balance.

1. Seven years shown based on the year chosen in cell E31 of Instructions and Notations worksheet. [↑](#footnote-ref-1)
2. Year choice in cell K4 and sector choice in cell E6 in purple boxes [↑](#footnote-ref-2)
3. Based on year choice on Monthly Performance worksheet [↑](#footnote-ref-3)
4. Compiled data for all reports for the 7 years based on year chosen in cell E31 of Instructions and Notations worksheet [↑](#footnote-ref-4)