Summary: Non-surveyed Oil and Gas Water Use Estimates, Including Fracking

Annual water use estimates are a vital portion of the data needed to develop water use projections for the State Water Plan as mandated by Texas Water Code Sec. 16.053 and Texas Administrative Code Sec. 357.31. The following is a high-level summary of the methods used by the TWDB for estimating the annual water volume used for non-surveyed oil and gas water use including fracking activities in Texas.

Hydraulic fracturing or 'fracking' comprises most of the water used in mining operations in Texas. Since 2011, all fracking operations are required to report their chemical use, total water volume, and geographic location to the National Hydraulic Fracturing Chemical Registry or 'FracFocus[1],' which provides this information in a pubic database.

The TWDB estimates water used for fracking based on total water use volumes and the geographic location which operations report to FracFocus for all fracking wells that began an active drilling operation during the desired year. Because the data is self-reported by the operation, several quality control steps are used to normalize the data.

1. Remove duplicates: TWDB staff query the FracFocus data for entries with identical water use volume, fracking job date, location, and well identifier. Each potential duplicate entry is reviewed across additional fields available in the FracFocus database and removed if the entry is determined to be a duplicate.
2. Verify GIS location: Using the latitude and longitude coordinates, each well reported in the desired year is projected into GIS and spatially joined to their corresponding county. All wells with a discrepancy between their reported county and the coordinate location county are researched in the Texas Railroad Commission's Public GIS Viewer[2] to determine the actual location of the well.
3. Identify and remove outliers: After verifying well location, the data is aggregated by their petroleum play (the geological formation containing the fossil fuel resource). Total water volumes for wells within each play are analyzed using a box and whisker analysis. Outliers are identified and removed based on their standard deviation.
4. Aggregate water uses by county, water planning regions and water source: After normalizing the fracking data, total water volumes are aggregated to develop county, river basin, and water planning region totals based on the geographic location of the well. Then the total water volume is increased by a factor of 10% to account for water used in the drilling process and water source (groundwater/surface water/reuse/brackish) split ratios are applied. Both the factor added for drilling and the water source splits are based on a study by the University of Texas, Bureau of Economic Geology (BEG) in 2011[3] and summarized in Table 1. In 2020 the BEG began a new study[4] to investigate mining water use in the state of Texas. The current drilling factor and water source splits will be subject to change based on new data trends.

Final results consist of estimated total water used for fracking in the state of Texas based on county, river basin, regional water planning area, and play location.

Table 1 - Water Source Splits by Play[3]

Play	Groundwater	Surface Water	Reuse	Brackish
Anadarko	40%	10%	20%	30%
Barnett	18%	74%	5%	3%
Bossier	67%	29%	5%	0%
Eagle Ford	72%	8%	0%	20%
Haynesville	67%	29%	5%	0%
Misc	74%	18%	5%	3%
Olmos	72%	8%	0%	20%
Permian	68%	0%	2%	30%
Permian-Far	20%	0%	0%	80%

NOTE: The final mining water use estimates presented on the TWDB website[5] comprises both the non-surveyed oil and gas water use estimates and surveyed mining water use including coal, ores, aggregates, and other mining activities.

References

[1] National Hydraulic Fracturing Chemical Registry: http://fracfocus.org/

[2] Texas Railroad Commission Public GIS Viewer: https://gis.rrc.texas.gov/GISViewer/

[3] Nicot, J-P., Reedy, R. C., Costley, R.A., and Huang, Y., Current and Projected Water Use in the Texas Mining and Oil and Gas Industry, 2011, TWDB Contract #0904830939: https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830939_MiningWaterUse.pdf

[4] 2022 Mining Water Use Proposed Study: https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/index.asp

[5] TWDB Water Planning Dashboard: https://www.twdb.texas.gov/waterplanning/data/dashboard/index.asp

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