BEFORE THE STATE OF NEW JERSEY BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE PETITION OF NEW JERSEY-AMERICAN WATER COMPANY, INC. FOR APPROVAL OF INCREASED TARIFF RATES AND CHARGES FOR WATER AND WASTEWATER SERVICE, AND OTHER TARIFF MODIFICATIONS

BPU Docket No. WR1912____

Direct Testimony of

GREGORY P. ROACH

Exhibit P-9

Direct Testimony of GREGORY P. ROACH

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1	1.	Q.	Please state your name and business address.
2		A.	My name is Gregory P. Roach. My business address is 555 East County Line Road,
3			Suite 201, Greenwood, Indiana 46143.
4	2.	Q.	By whom are you employed and in what capacity?
5		A.	I am employed by American Water Works Service Company, Inc. (the "Service
6			Company") as Manager of Revenue Analytics. My responsibilities include leading
7			the Revenue Analytics group, whose main area of focus is the analysis and
8			forecasting of system delivery, customer usage and revenue for the Service
9			Company affiliates, including New Jersey-American Water Company, Inc.
10			("NJAWC" or the "Company").
11	3.	Q.	What are your responsibilities in this position?
12		A.	I manage and direct a team of financial and regulatory analysts whose
13			responsibilities are to analyze and project customer water usage, system delivery,
14			customer counts and water and sewer sales revenues for each of the American
15			Water affiliate companies. As such, our group supports both the regulatory and
16			financial functions of the Service Company organization and the affiliated
17			American Water companies.

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4. Q. Please describe your educational background and professional associations.

A. I graduated from Indiana University in 1980 with a Bachelor of Arts degree in

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Economics and Political Science. I graduated from Butler University in 1982 with

1 a Master's Degree in Economics. I am a past member of the National Association 2 of Business Economist and the American Economic Association. 3 5. Q. Please detail your business experience. A. I have over 25 years of experience working in the electric, gas and water utility 4 5 sectors as both a consultant and utility employee. I began my career with Public 6 Service Indiana (now a part of Duke Energy) in January of 1980, continuing as an 7 economist for a large consulting firm and a regulatory consultant through my own 8 firm, and then joining the Service Company in 2011. The details of my professional 9 experience are provided in Appendix A to this testimony. 10 6. Q. Have you previously testified before the New Jersey Board of Utilities, other 11 regulatory agencies, or civil courts related to utility matters? 12 A. Yes, I provided testimony in the 2017 NJAWC rate case before the New Jersey 13 Board of Public Utilities ("BPU" or the "Board") BPU Docket No. WR17090985. 14 Additionally, I have provided testimony before the following regulatory bodies: the 15 Indiana Utility Regulatory Commission, the Missouri Public Service Commission, 16 the Illinois Commerce Commission, the Public Service Commission of New York, 17 the Pennsylvania Public Utility Commission, the Public Utilities Commission of 18 Ohio, the Iowa Utilities Board, the Public Service Commission of West Virginia, 19 the Public Service Commission of Louisiana, the Council of the City of New 20 Orleans, the Virginia State Corporation Commission, the Public Utility 21 Commission of Texas, the Arkansas Public Service Commission, the Common

Pleas Court of Ohio, the Illinois Commerce Commission and the Federal Energy
 Regulatory Commission.

3 SCOPE OF TESTIMONY

4 7. Q. What is the purpose of your testimony in this proceeding?

5 A. My direct testimony supports the direct testimony of Mr. Charles Rea regarding 6 NJAWC's Post-Test Year sales and revenue adjustments, and the direct testimony 7 of Mr. John Watkins related to the need for a revenue stabilization mechanism 8 ("RSM"). As occurs for most public utilities with service to residential customers, 9 NJAWC's sales and resulting revenues are subject to seasonal and annual swings 10 based on climatic changes that occur from month to month and year to year. As Mr. 11 Watkins will testify, an RSM would allow NJAWC to stabilize its revenues from 12 the effects of these climatic induced swings in sales and revenues. Further, NJAWC 13 has experienced residential declining usage per customer since approximately the 14 year 2003, and my analysis indicates it will continue to experience residential 15 declining usage per customer for the foreseeable future. My testimony discusses 16 the analyses we have performed that identify and define this declining usage 17 historically and demonstrates that the trend of declining usage will continue beyond 18 the Test Year. These analyses show there is a continuing annual decline in 19 residential water use across all NJAWC districts averaging a combined 20 approximate -1,203 gallons per customer per year ("gpcy"), or approximately -21 3.295 gallons per customer per day ("gpcd"). Furthermore, the ongoing and 22 significant nature of the residential declining usage trend offers additional

1		justification for the creation and application of a RSM that will allow NJAWC the
2		opportunity to attain the revenues used to set rates in this proceeding ("Authorized
3		Revenue").
4	8. Q.	Have you prepared, or caused to be prepared, schedules in support of the
5		Company's application to increase rates?
6	A.	Yes, I am sponsoring the following schedules:
7		• Schedule GPR-1: AWK Residential Usage Trend 2007-2016;
8		• Schedule GPR-2: US Water Fixture Specifications;
9		• Schedule GPR-3: Reasonableness of NJAWC Residential Consumption
10		Decline;
11		• Schedule GPR-4: State of New Jersey - Housing Stock Vintage;
12		• Schedule GPR-5: Effect of Tornado Rebuild on Water Usage; and
13		• Schedule GPR-6: Authorized and Actual Revenue & Water Sales.
14	9. Q.	Were each of Schedules GPR-1 through GPR-6 prepared by you or under your
15		direction and supervision?
16	A.	Yes.
17	10. Q.	What were the sources of the data used to prepare Schedules GPR-1 through
18		GPR-6?
19	A.	The data used to prepare these exhibits was obtained from the Company's SAP
20		system, the US Bureau of Economic Analysis, the US Bureau of Labor Statistics,

1		the US Bureau of the Census and the National Oceanic and Atmospheric
2		Administration.
2	11 0	De Schedeler CDD 1 thread CDD (inclusion examples and
3	11. Q.	Do Schedules GPR-1 through GPR-6, inclusive, accurately summarize such
4		data and the results of analyses using such data?
5	A.	Yes, they do.
6	12. Q.	Have you prepared a glossary of the technical and statistical terms used in
7		your testimony?
8	A.	Yes, a Glossary of Technical and Statistical Terms is provided as Appendix B to
9		my testimony.
10	13. Q.	Please summarize your testimony.
11	A.	My testimony presents the normalized usage for residential and commercial
12		customers, which is subsumed in the econometric models developed for those
13		customer classes. In addition to determining weather-normal levels of usage, the
14		models also quantify and estimate the potential term and impact of the declining
15		usage trend of NJAWC's residential customers. My analysis concludes the
16		following:
17		1. There is a continuing annual decline of residential water use across all NJAWC
18		districts averaging 1,203 gallons per customer.
19		2. The revised mandated efficiency standards for water fixtures will support the
20		existing trend of declining usage into the foreseeable future.

1	3. Sin	milar water use trends as are seen with NJAWC are occurring within affiliated
2	Ar	nerican Water systems.
3	4. En	npirical analysis indicates that the NJAWC use trend:
4	a.	Is projected to continue for up to the next 29 years.
5	b.	Is confirmed by the Joplin case study that illustrates that a significant
6		reduction in usage per household (-8.4%) can rapidly occur due to water
7		fixture replacement. This reduction is an amount equal to approximately an
8		entire month's level of water sales.
9	c.	Is also confirmed by the permanent residential water use reductions that
10		have endured following removal of mandatory state water use restrictions
11		during the drought of 2016-2017.
12	NORMALIZ	ED USAGE AND FORECASTS
13	14. Q. Do sea	asonal factors affect residential and commercial usage?
14	A. Yes.	Outdoor usage by most residential customers and many commercial
15	custon	ners is seasonal. Generally, in the residential customer class, outdoor usage
16	during	the summer season includes discretionary usage including turf and
17	landsc	ape irrigation, car washing, swimming pool fills, and similar such activities.
18	Many	commercial customers also exhibit seasonal usage patterns similar to
19	reside	ntial customers, although the class as a whole is somewhat less affected.

Short-term summer weather patterns will influence outdoor water use; for instance, 21 turf irrigation decreases during a rainy period and increases during a dry period.

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These weather-related fluctuations in usage can mask underlying trends that occur

1	on a monthly and annual basis that require a weather normalization	approach to
2	residential customer usage modeling and forecasting to identify and c	apture long-
3	term customer usage trends.	
4	15. Q. Did you make a discrete weather normalization in this case to accou	unt for such
5	seasonal weather adjustments?	
6	A. No. As I explain in the succeeding sections concerning the regressi	ion analysis,
7	due to the addition of two variables – cooling degree days and precipita	ation – to the
8	regression models, we capture the effects of weather and need not make	ke a separate
9	adjustment to normalize revenue for weather, such as was made in the	last case.
10	16. Q. Please describe your forecasting analysis.	
11	A. I examined historical and forecasted sales by analyzing regression ana	lyses for the
12	Residential and Commercial classes and was able to model resi	idential and
13	commercial usage successfully using regression analysis. The Industry	rial, Sale for
14	Resale and Other Public Authority classes' water usage, however, is	significantly
15	more heterogeneous as compared to NJAWC Residential and	Commercial
16	customer usage. Hence, it is difficult to apply statistical techniques to t	these classes
17	as usage varies greatly from customer to customer in response	to climatic
18	conditions as well as efficiency improvements in water fixtures and ap	pliances. In
19	many cases, the use of water as part of a specific production process,	such as with
20	Industrial customers, tends to obscure the impact of either climate of	or water use
21	efficiency standards on specific customers' usage patterns. I	Due to the
22	heterogeneous customer mixtures of these groups, we have chosen	to use a 36-

1	month average to forecast their future usage as described in the testimony of Mr.
2	Charles Rea. The discussion that follows, therefore, focuses on the forecasted usage
3	in the Residential and Commercial Classes. Mr. Rea also translates that declining
4	usage into a revenue forecast for the Residential and Commercial classes based on,
5	among other things, forecasted numbers of customers in that class.
6	RESIDENTIAL USAGE REGRESSION ANALYSIS
7	17. Q. Please describe the analytical methodology you employed related to NJAWC
8	residential usage trends?
9	A. Our analysis examined the annual average of monthly per customer consumption
10	by NJAWC's residential customers over the past ten years. Presented in Figure
11	GPR-1 is the residential usage per customer data that formed the basis of the
12	analysis. To this data, we applied standardized statistically linear regression
13	analysis a) to estimate the residential customer usage trend over time and b) to
14	normalize the residential customer usage data for the potential impact of weather.
15	We analyzed the impact of time, cooling degree-days (CDD), days with 90 degree
16	maximums, and precipitation (precip) as independent explanatory variables for the
17	trend of residential usage per customer over the time series analyzed. Figure GPR-1

1 illustrates the residential average usage per customer trend over that same time

2 frame.



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4 18. Q. What are the results of your analysis?

A. The results of our linear regression analysis based on the explanatory variables
time, precipitation and cooling degree days (July – Sept) indicate that residential
usage per customer is declining at a rate of approximately 1.76% or 1,203 gallons
per customer per year, which is equivalent to 3.30 gpcd. Figure GPR-2 graphically
illustrates that residential average usage trend.





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2 My analysis employed the use of numerous regression models exploring varying 3 combinations of potential explanatory variables including time and various climatic variables. Table GPR-1 below summarizes the types of models that we evaluated 4 and their relative statistical merits. As delineated in Table GPR-1, all but two of 5 6 the models resulted in a reasonable R-Square, meaning that each of the models 7 explains in excess of 75% of the variance in NJAWC residential usage per customer 8 over the period of 2010-2019. Three of the climatic variables – annual cooling 9 degree days, precipitation and days with Maximums in excess of 90 degrees 10 Fahrenheit were statistically significant or resulted in logically relevant explanatory 11 variables for NJAWC residential average usage as delineated by the t-statistic 12 results. For each of the other weather variables, the regression coefficients could

1 not be estimated with anything less than a +/-50% error or resulted in an illogical 2 relationship with residential average usage (such as increases in precipitation 3 illogically producing additional residential average usage when common 4 knowledge would predict that water usage increases during periods of relatively 5 lower precipitation). Hence variables with a positive coefficient related to 6 precipitation and usage are both illogical from anecdotal experience and are 7 statistically unsupportable. As a result, inclusion of these climatic variables in the 8 final model was statistically unsupportable. Table GPR-1 illustrates the relevant 9 statistical results of the models evaluated.

In summary, I have chosen to rely on the NJAWC residential average use model
defined by the statistically significant explanatory variables time and the climatic
explanatory variables; annual cooling degree days and precipitation (July – Sept)
due to this model's highest R-Square and F-Statistic with minimizing the error of
the estimate as compared to all the other residential models evaluated.

				I	able GPR-1								
				New Jers	ey American V	Vater							
				Residential Usage Pe	er Customer M	odel Summ	aries						
				-				T-St	atistic				
Model	Period Ending	R-2	F-Statistic	Durbin-Watson	Day	CDD	JLSRain	MORain	DX90	TMAX	TAVG	Lag	Custs
2017 Case													
NJAWC System	Dec	0.962			-13.25								566k
A-1 (SA1)	Dec	0.988			-23.6								347k
A-3 (SA2)	Dec	0.887			-7.31								206k
A-5 (Manville & 1-D)	Dec	0.769			-4.26								4.3k
A-8 (Southampton)	Dec	0.775			-4.91								0.4k
A-10 (Pennsgrove)	Dec	0.883			-7.2								4.0k
2019 Case													
Day, CDD, MORain	June	0.841	6.618	1.995	-2.469	2.689		-2.278				0.288	595k
Day, CDD, JLSRain	June	0.858	7.545	1.945	-2.870	2.797	-2.528					0.677	595k
Day, DX90	June	0.744	10.157	1.804	-3.759				2.505				595k
Day, TMAX	June	0.651	6.524	2.922	-3.358					1.656			595k
Day, TAVG	June	0.613	5.532	2.642	-3.149						1.334		595k

1	19. Q. Did y	ou make any adjustments to your final model?
2	A. Yes, I	have. The initial modeling reported a Durbin-Watson statistic of 1.823,
3	which	indicates the presence of autocorrelation of the error terms. I employed a
4	standa	rd statistical process to eliminate any potential coefficient estimate bias.
5	20. Q. Does	your model imply that the mere passage of time is the major driver of
6	declin	ing use per customer?
7	A. No. T	ime simply captures the range of conservation effects, such as the installation
8	of mo	re water efficient fixtures and appliances that occur over time. Of course
9	time,	itself, is of no consequence, but it is a powerful variable because it is the
10	mediu	m for capturing the conservation effect. Further, as the models indicate, time
11	is a v	ery powerful statistical explanatory variable, as indicated by the high R-
12	square	ed values. With the addition of the cooling degree day and precipitation
13	variab	les in the final model, I am able to normalize residential average usage per
14	custor	ner for climatic variations that occur from year to year. Later in my
15	testim	ony, I will describe some of the reasons for the declining usage per customer,
16	explai	n how they affect consumption and show that this trend will not diminish any
17	time s	oon. Suffice it to say at this point that, since approximately 2003, residential
18	usage	has declined on a per-customer basis in the NJAWC service territory and the
19	slope,	or change rate, of residential decline has accelerated since the passage of
20	more	stringent water fixture and appliance usage regulations in the 2000s. The
21	declin	e is attributable to several key factors, including but not limited to the
22	follow	ving: increasing prevalence of low flow (water efficient) plumbing fixtures

1	and appliances in residential households; customers' conservation efforts;
2	conservation programs implemented by the federal government, state government,
3	NJAWC and other entities. Accordingly, this trend of declining use per residential
4	customer should be employed to forecast residential usage though the end of
5	NJAWC's Post-Test Year adjustment period.

6 21. Q. How does the residential usage modeling you are sponsoring in this case 7 compare to the analysis you sponsored in NJAWC'S prior rate case?

A. The analyses in the two cases are similar in terms of methodology. The principle 8 9 difference is that in the prior case, we separately normalized for weather based on 10 a 10-year average. In this case, by the addition of two additional, weather-related 11 variables to the regression analyses, (i.e., cooling degree days and precipitation) we 12 no longer have to normalize for weather separately. The 2019 analysis continues 13 to demonstrate that time is the main statistically significant explanatory variable 14 but is also influenced by climatic indices. I found one modification to the 2017 15 analysis was warranted, however: due to billing and timing differences, using the bifurcated approach was complicated by billing data or events that may bleed into 16 17 or outside of the "base period." Further, my previous analysis was complicated by 18 the impact of the Polar Vortex influence during the winter of 2014. So, I 19 determined that it was appropriate not to bifurcate the residential usage data into 20 base (non-discretionary non-weather sensitive usage) and non-base (discretionary 21 weather sensitive usage) water usage components in order to eliminate the possible

- 1 impact of timing in billing, better simulate the impact of climatic conditions on
- 2 usage, and rely on annual average usage for the analysis used in this case.

3 22. Q. How did the decision not to use a bifurcated analytical approach compare to

- 4 NJAWC's 2017 rate case analysis?
- 5 A. Table GPR-2 illustrates the difference in results from the residential trend analytics
- 6 I am sponsoring in this proceeding as compared to the approach used in the previous

Table GPR-2 New Jersey American Water Residential Usage Per Customer Model Summaries					
Model	Model Period Ending Gal/Cust/Yr % Annum Custs				
2017 Case					
NJAWC System	Dec	-1,080	-1.54%	566k	
A-1 (SA1)	Dec	-912	-1.28%	347k	
A-3 (SA2)	Dec	-1,344	-1.88%	206k	
A-5 (Manville & 1-D)	Dec	-648	-1.14%	4.3k	
A-8 (Southampton)	Dec	-1,188	-2.43%	0.4k	
A-10 (Pennsgrove)	Dec	-1,416	-2.37%	4.0k	
2019 Case					
Day, CDD, JLSRain	June	-1,203	-1.76%	595k	

2017 NJAWC rate case. To summarize that table, the change in analytical approach
results in an annual -0.22% or -123 gpcy difference in usage per residential
customer as compared to the approach and period analyzed for the 2017 NJAWC
rate case. The differences in the results of this analysis from those filed in the 2017
case are due mainly to incorporating and modeling the influence of climatic factors,
particularly the impact of the 2014 data point, to our previously modeling results.

1	23. Q.	Setting aside the weather normalization analysis you have performed for
2		residential usage in this case and focusing on the actual NJAWC average
3		residential usage per customer per month since 2016, what has been the trend
4		of that usage?
5	A.	Table GPR-2A shows that even with the influence of weather fluxuations impacting
6		the actual data, residential average usage per month has been declining by 190

7 gpcm or -3.1% per annum over that time period.

Table GPR-2A NJAWC Residential Customers Average Usage Per Month 2016-2019				
	Res Usage	Differ	ence	
Year	gpcm	Gallons	%	
2016	6,200			
2017	6,181	-19	-0.3%	
2018	5,815	-365	-5.9%	
2019	5,631	-184	-3.2%	
Average		-190	-3.1%	

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9 COMMERCIAL USAGE REGRESSION ANALYSIS

10 24. Q. Have you performed a similar analysis of commercial usage for NJAWC?

A. Yes, I have. Using the same regression type analysis described above to forecast
 NJAWC system-wide residential customer usage per customer, I have performed
 an analysis of the trend for commercial usage per customer inclusive of all NJAWC
 commercial customers.

1 25. Q. Please describe the water use trend among NJAWC's commercial customers. 2 A. Similar to the residential class, since the early 2000s, commercial usage has 3 declined on a per-customer basis in the NJAWC service territory. The slope, or 4 change rate, of residential decline has accelerated since the passage of more 5 stringent water fixture and appliance usage regulations in the 2000s. As with the 6 residential class, the decline is attributable to several key factors, including but not 7 limited to the following: increasing prevalence of low flow (water efficient) 8 plumbing fixtures and appliances in commercial establishments; customers' 9 conservation efforts; conservation programs implemented by the federal 10 government, state government, NJAWC and other entities; and price elasticity. The 11 trend of this decline in Commercial usage per customer is illustrated in Figure GPR-12 3 below.



1 26. Q. Do seasonal factors affect commercial usage?

A. Yes. Similar to the residential class, outdoor usage by many commercial customers is seasonal and the regression analysis also included climatic variable in addition to the time variable that captures conservation. Also, just as with the residential class, these seasonal factors are captured by our models which do not require a separate step to normalize for weather variability.

7 27. Q. What are the statistical and forecast results of your analysis?

A. As graphically illustrated in Figure GPR-4 below, the results of our linear
 regression analysis based on the explanatory variables time, annual cooling degree
 days and precipitation (June – Sept) indicate that commercial usage per customer
 is declining at a rate of approximately -0.69% or -2,774 gallons per customer per



1	year, which is equivalent to -7.6 gallons gpcd. Figure GPR-4 graphically illustrates
2	that residential average usage trend.

As with the residential analysis, I employed the use of numerous regression models exploring varying combinations of potential explanatory variables including time and various climatic variables. Table GPR-3, below, summarizes the types of models that we evaluated and their relative statistical merits. As delineated in Table

					Table	GPR-3								
				New	Jersey Ar	nerican \	Nater							
			Comme	ercial Usa	age Per Cu	stomer N	/lodel Sum	maries						
									T-Sta	tistic				
Model	Period Ending	R-2	F-Statistic	DW	Day	CDD	JLSRain	JSRain	MSRain	DX90	TMAX	TAVG	Lag	Custs
2017 Case														
NJAWC System	Dec	0.554			-2.41									41k
A-1 (SA1)	Dec	0.828			-2.64									29k
A-3 (SA2)	Dec	0.761			-3.85									12k
2019 Case														
Day, CDD, MSRain	June	0.773	6.803	1.640	-3.066	3.464			-2.883					
Day, CDD, JSRain	June	0.808	5.257	1.865	-2.400	3.250		-2.982					0.973	45k
Day, DX90	June	0.727	9.325	1.456	-2.582					3.484				45k
Day, TMAX	June	0.486	3.315	2.295	-2.027						1.780			45k
Day, TAVG	June	0.466	3.060	2.203	-1.960							1.670		45k

7 GPR-3, all but two of the models resulted in a reasonable R-Square, meaning that 8 each of the models explains in excess of 75% of the variance in NJAWC 9 commercial usage per customer over the period of 2010-2019. Similar to the 10 residential modeling, three of the climatic variables – annual cooling degree days, 11 precipitation and days with Maximums in excess of 90 degrees F were statistically 12 significant or resulted in logically relevant explanatory variables for NJAWC 13 residential average usage as delineated by the t-statistic results. For each of the 14 other weather variables, the regression coefficients could not be estimated with anything less than a +/- 50% error or resulted in an illogical relationship with 15

1 commercial average usage (such as increases in precipitation illogically producing 2 additional commercial average usage when common knowledge would predict that 3 water usage increases during periods of relatively lower precipitation). Hence 4 variables with a positive coefficient related to precipitation and usage are both 5 illogical from anecdotal experience and are statistically unsupportable. As a result, 6 inclusion of these climatic variables in the final model was statistically 7 unsupportable. Table GPR-3 illustrates the relevant statistical results of the models 8 we evaluated.

In summary, I chose to rely on the NJAWC commercial average use model defined
by the statistically significant explanatory variables time and the climatic
explanatory variables; annual cooling degree days and precipitation (June – Sept)
due to this model's highest R-Square and F-Statistic with minimizing the error of
the estimate as compared to all the other commercial models evaluated.

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28. Q. How did the decision not to use a bifurcated analytical approach compare to the 2017 rate case commercial class analysis?

A. Table GPR-4 illustrates the difference in results from the commercial trend analytics I am sponsoring in this proceeding as compared to the approach used in the 2017 NJAWC rate case. To summarize that table, the change in analytical approach results in an annual -0.31% or -1,178 gpcy difference in usage per commercial customer as compared to the approach and period analyzed for the 2017 NJAWC rate case for all NJAWC commercial customers. The differences in the results of this analysis from those filed in the 2017 case are due mainly to

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incorporating and modeling the influence of climatic factors, particularly the

2 impact of the 2014 data point, to my previous modeling results.

Table GPR-4 New Jersey American Water Commercial Usage Per Customer Model Summaries				
Model	Period Ending	Gal/Cust/Yr	% Annum	Custs
2017 Case				
NJAWC System	Dec	-1,596	-0.38%	41k
A-1 (SA1)	Dec	-1,140	-0.30%	29k
A-3 (SA2)	Dec	-3,264	-0.68%	12k
2019 Case				
Day, CDD, JSRain	June	-2,774	-0.69%	45k

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4 <u>DECLINING WATER CONSUMPTION</u>

5 29. Q. You mentioned that the declining usage per customer experience of NJAWC
6 is not unique among the companies of the American Water system. Have you
7 studied water consumption trends for other American Water subsidiaries?
8 A. Yes, I have.

9 30. Q. Are the results of your analysis of NJAWC residential customers' usage 10 consistent with the results of your analyses in other states?

A. Yes, they are consistent. I have studied the residential consumption patterns for
 other American Water state operating systems located in climates and geographies
 similar to New Jersey. The trend experienced by NJAWC is very similar to the
 trends experienced in other affiliate states including Missouri, Pennsylvania,
 Illinois and Indiana. The results of my analysis are shown on Schedule GPR-1,

1	which illustrates that states in the American Water footprint have experienced a
2	decline in residential consumption per customer averaging approximately -2.0%
3	per year over the last 10 years. The estimated NJAWC system-wide reduction in
4	residential customer usage per year of -1.76% falls close to the mean, appears
5	reasonable, and is well within the bounds of the comparable rates of decline
6	experienced by similar states in the American Water footprint.
7	31. Q. Is this trend being observed across the industry, beyond NJAWC and other
8	American Water companies?
9	A. Yes. According to the 2010 Water Research Foundation ("WRF") report, "many
10	water utilities across the United States and elsewhere are experiencing declining
11	water sales among households." ¹ The report further states: "A pervasive decline
12	in household consumption has been determined at the national and regional levels. ²
13	32. Q. What is causing the decline in residential customers' usage?
14	A. Several factors drive the decline in residential customers' usage. These factors
15	include the incremental introduction of low-flow fixtures and appliances, new
16	regulations that lead to further reductions in fixture flow-rates, conservation
17	programs and public initiatives that have led to greater consumer water
18	conservation awareness.

 ¹ Coomes, Paul et al., North America Residential Water Usage Trends Since 1992 – Project #4031, page 1 (Water Research Foundation, 2010).
 ² Id., at xxviii.

33. Q. Please explain what you mean by the introduction of low-flow fixtures and appliances.

3 A. Plumbing fixtures such as toilets, showerheads, and faucets available to consumers 4 today are more water-efficient than were those fixtures manufactured in the past. 5 Similarly, appliances such as dishwashers and washing machines are also more 6 water-efficient. When a customer replaces an older toilet, washing machine, or 7 dishwasher with a new unit, the new unit will almost certainly use less water than 8 Similarly, construction of new homes or business the one it replaced. 9 establishments result in the installation of water efficient fixtures meeting new, 10 more efficient, regulatory standards. Further, every time a customer remodels or 11 installs new appliances in his or her kitchen, bathroom or laundry room, he or she 12 will consume less water in the future.

13 **34. Q. How much water do the new fixtures and appliances save?**

14 A. The Energy Policy and Conservation Acts of 1992 and 2005 ("EPAct92" and 15 "EPAct05," respectively) mandated the manufacture of water-efficient toilets, showerheads and faucet fixtures. For example, a toilet manufactured after 1994 16 17 must use no more than 1.6 gallons per flush, compared to a pre-1994 toilet, which 18 typically used from 3.5 to 7 gallons per flush. In fact, toilets using only 1.28 gallons 19 per flush or less are becoming more prevalent in the marketplace. Replacing an old 20 toilet with a new one, therefore, can save from 2 to nearly 6 gallons per flush. The 21 United States Environmental Protection Agency ("USEPA") estimates that there 22 are more than 220 million toilets in the United States, and that approximately 10

1

2

million new toilets are sold each year for installation in new homes and businesses or replacement of aging fixtures in existing homes and businesses.

3 The Energy Independence & Security Act of 2007 ("EISA"), which established 4 stringent efficiency standards for dishwashers and washing machines has further 5 reduced indoor water consumption. Dishwashers manufactured after 2009 and 6 washing machines manufactured after 2010 must use 54% and 30% less water, respectively. All other factors being equal, a typical residential household in a new 7 home constructed in 2015, with water efficient toilets, washing machines, 8 9 dishwashers and other fixtures, uses approximately 35% less water for indoor 10 purposes than a non-retrofitted home built prior to 1994. Schedule GPR-2, pages 11 1-3 provides additional detail about the expected impact of water efficiency 12 measures on residential water consumption.

35. Q. Please elaborate on other factors contributing to the continued decline in residential water consumption patterns.

15 A. Programs to raise customer awareness and interest in the benefits of conserving 16 water and energy continue to increase. For example, WaterSense is a USEPA 17 voluntary partnership program that seeks to protect the future of our water supply 18 by offering people a simple way to use less water with water-efficient products, 19 new homes, and services. Schedule GPR-2, pages 4-12 detail these program's 20 specifications as well as others. This listing is a reproduction of the Alliance for 21 Water Efficiency Water Products Standard Matrix, which was last updated in 22 March 2010.

1	As awareness of water and energy efficiency increases, customers may decide to
2	replace a fixture or appliance even before it has broken. Additionally, customers
3	may further reduce consumption by changing their household water use habits in
4	other various ways. Our analysis of declining usage per customer indicates that the
5	Company's residential customers will continue to reduce their usage by
6	approximately 3.3 gallons per customer per day on average. A 3.3 gallon per day
7	decrease can be achieved by subtle changes in customer behavior. For instance,
8	here are some ways a customer can reduce 3.3 gallons per day:
9	• Taking a shower that is 1 minute shorter;
10 11	• Flushing a low-flow toilet fixture instead of an older toilet just once per day;
12	• Running the dishwasher 5 times per week instead of 7; or
13 14	• Turning off the water for approximately 1 minute while brushing their teeth.
15	36. Q. Do you expect the NJAWC customer declining usage trend to continue in the
16	future?
17	A Yes. Water efficient fixtures and other drivers such as conservation education and
18	government-mandated standards will continue to drive further efficiency into
19	residential usage per customer. In fact, the trend is well established and continues
20	to affect water usage on the NJAWC system as well as most water utilities across
21	the United States. The rate of the continued trend is dependent on the pace of
22	fixture replacement within the NJAWC service footprint as well as the broadening
23	acceptance of a conservation ethic through raised customer and business awareness

programs, government conservation policy, and similar behavior modification
 related programs.

3 As I will explain further, below, many of the homes in New Jersey are older housing 4 stock, built prior to 2000. These homes were constructed with toilets, washing 5 machines, and dishwashers that are more water-intensive than newer fixtures and 6 appliances now on the market. As turnover of household fixtures and appliances 7 continues to occur over time, residential usage will continue to decline accordingly. The regulations mandating water efficient washing machines and dishwashers also 8 9 are relatively new. Given the life expectancy of appliances, it is likely that the 10 replacement of existing appliances, and the corresponding reduction in water used. 11 will continue to occur over time for the indefinite future.

12 According to an American Water Works Association ("AWWA") Journal article 13 dated February 2012, technology is now available for newer, more water efficient 14 products that further improve on Energy Policy Act levels, and there is now a 15 growing movement to codify these more stringent specifications. The introduction 16 of progressive code modifications-such as the International Code Council's 17 ("ICC's") International Green Construction Code ("IGCC") and the International 18 Association of Plumbing and Mechanical Officials ("IAPMO") Green Plumbing 19 and Mechanical Code Supplement (2011) support uniform implementation of increased water efficiency standards.³ AWWA research also indicates that this 20

³ Hoecker, Jay and Bracciano, David. Tampa Bay Water. "Passive Conservation: Codifying the use of Water-Efficiency Technologies" February 2012, Journal AWWA. 104:2.

1	decline in water consumption will continue. An article in the June 2012 issue of
2	the AWWA Journal entitled "Insights into declining single-family residential water
3	demands" states: "[r]educed residential demand is a cornerstone of future urban
4	water resource management. Great progress has been made in the last 15 years and
5	the industry appears poised to realize further demand reductions in the future." ⁴
6	As I stated, the regulations mandating water efficient washing machines and
7	dishwashers also are relatively new. Based solely on the life expectancy of
8	appliances, it is likely that the replacement of existing appliances, and the
9	corresponding reduction in water used, will continue to occur for at least the next
10	11 years or more (from compliance date for appliance manufactures to meet the
11	new flow rates) if all appliances were replaced in their average life cycles. ⁵
12	37. Q. Is the decline in residential water consumption showing any signs of reaching
13	equilibrium?
14	A. No. New water efficiency technology and regulations are expected to continue to
15	drive water use downward in the future. As explained by the American Council for
16	Energy Efficiency:
17 18 19 20	Home appliance manufacturers and energy efficiency advocates have recently agreed to improved efficiency standards and tax policies for refrigerators, freezers, clothes washers, clothes dryers, dishwashers, and room air conditioners. This agreement could save
<i>∠</i> 1	enough energy to meet the total energy needs of 40 percent of

⁴ DeOreo, William and Mayer, Peter. American Water Works Association Journal. Vol. 104. Issue 6. http://apps.awwa.org/WaterLibrary/showabstract.aspx?an=JAW_0076117. June 2012

⁵ The average life expectancy of a new dishwasher, clothes washer and gas water heater is 11 years. An electric water heater has an average life one year longer. http://www.statista.com/statistics/220020/average-life-expectancy-of-major-household-appliances/ Consequently, it should be obvious that the trend of declining use due to appliance replacement will continue for years to come.

1 2 3	Ar me Ar	nerican homes for one year and the amount of water necessary t et the current water needs of every customer in the City of Lo geles for 25 years. ⁶	to DS
4	These hig	her-efficiency dishwasher and washing machine standards inc	clude tax
5	incentives	for consumer purchases that became effective in January 2	2013 and
6	January 20)15, respectively.	
7	38. Q. Have you	researched and identified recent water conservation stud	lies with
8	similar co	nclusions to those cited in your testimony?	
9	A. Yes, I hav	e. The following studies reach similar conclusions as those cite	ed above:
10	<u>Residentia</u>	<u>l End Uses of Water</u> , Version 2 by the Water Research Foundat	ion dated
11	April 201	5; Study: Efficient Fixtures Cut US Indoor Water Use by Circle	e of Blue
12	dated Apr	il 25, 2016; and <u>Why Overall Water Use Is Declining in US</u>	S Despite
13	Population	<u>Growth</u> , Environmental Leader dated January 2, 2019. The	results of
14	these cont	emporary studies affirm and support the original findings I have	e cited in
15	detail. Th	at is, there is a water industry-wide recognized trend of resident	tial water
16	usage red	actions due to conservation effects from fixture/appliance re	gulation,
17	consumer	conservation behavior and the age of housing stock which influ	ences the
18	installatio	n of water conserving devices throughout the United States.	Further,
19	these stud	es affirm that these trends are expected to continue into the for	reseeable
20	future. Th	ese contemporary studies provide further evidence illustrating a	a trend of
21	residential	customer water usage reductions going forward.	

⁶ American Council for Energy Efficiency, Major Home Appliance Efficiency Gains to Deliver Huge National Energy and Water Savings and Help to Jump Start the Smart Grid, available at <u>http://aceee.org/press/2010/08/major-home-appliance-efficiency-gains-deliver-huge-natio</u>. Date Accessed: 8/7/2012.

39. Q. Have you performed an analysis of the likely future of the declining use trend for NJAWC?

3 A. Yes, I have developed estimates of the usage impact of the WaterSense/Energy Star 4 usage specifications for a family of four. The results of that analysis are depicted 5 on Schedule GPR-3. Generally, the model multiplies the typical usage per capita 6 by the estimated reduction for specific appliance usage from the pre-regulatory 7 standard in place until 1994 to the WaterSense/Energy Star usage specifications in 8 effect since 2010/2011, respectively, by the number of users in a proto-typical 9 household (4 in this example), annualized. I then summed the various usage 10 reductions for the sample four users across all fixtures that could be replaced to get 11 an average total usage reduction. My analysis indicates that a set of four users 12 would see a reduction of approximately 54,315 annual gallons over the course of a 13 year, due to fixture and appliance replacement at the Water Sense/Energy Star 14 specification levels.

15 The estimated reduction in usage analysis of the sample household of four allows 16 for the estimation of the length of time over which all appliances in the NJAWC 17 service territory will be converted to meet the Water Sense/Energy Star 18 specifications. Dividing the total estimated annual residential usage decline for 19 NJAWC of 705 million gallons by the estimated annual usage decline for the 20 sample household of four of 54,315 gallons, reveals that 12,988 residential 21 customers, or 2.21% of the 2019 year-to-date (June) average of 586,406 residential 22 customers, would need to make these fixture changes to account for the estimated

1	total annual residential declining usage. Further, taking the reciprocal of the 2.21%
2	of residential customers needed to account for the annual usage decline reveals a
3	theoretical term of 45 years to fully convert the installed fixture base to the Wate
4	Sense/Energy Star usage specifications, all other factors remaining equal. New
5	water efficiency technology and regulations are expected to continue to drive wate
6	use downward
7	40. O Hoven't new fodered regulations related to officiency standards for water
/	40. Q. Haven't new lederal regulations related to eniciency standards for water
8	using fixtures and appliances already had their full impact on NJAWC
9	residential customer usage?
10	A. No, not at all. Due to the age of the New Jersey residential housing stock, these
11	water efficiency standards have only just begun to have an impact on New Jersey
12	residential usage. The potential impact of replacing these fixtures is significant as
13	according to the 2017 American Housing Survey, 88.6% of the homes in New
14	Jersey were built prior to the year 2000 ⁷ (79.2% of homes prior to 1990). ⁸ Schedule
15	GPR-4 details this data, which is summarized in Table GPR-5, below. This data
16	illustrates that 88.6% or more of the New Jersey housing stock was constructed
17	with toilets, washing machines, and dishwashers that are much more water
18	intensive than newer fixtures and appliances now on the market that will eventually
19	replace the existing fixture and appliance stock.

⁷ U.S. Census Bureau, Selected Housing Characteristics. 2010 American Community Survey 5-Year Estimates (2006-2010), *http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml. ⁸ U.S. Census Bureau, Selected Housing Characteristics. 2017 American Community Survey 10-Year

Estimates (1990-1999), available at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

Housing Stock Vintage				
State of New Jersey				
		State of Ne	w Jersey	
Year Structure Built		Units	% Total	
Built 2014 or later		21,897	0.61%	
Built 2010 to 2013		51,031	1.42%	
Built 2000 to 2009		334,957	9.32%	
Built 1990 to 1999		341,793	9.51%	
Built 1980 to 1989		427,942	11.90%	
Built 1970 to 1979		458,582	12.76%	
Built 1960 to 1969		486,259	13.53%	
Built 1950 to 1959		547,187	15.22%	
Built 1940 to 1949		269,846	7.51%	
Built 1939 or earlier		655,561	18.24%	
Total housing units		3,595,055	100.00%	
Percentage Prior to 00			88.65%	

Table GPR-5 New Jersey American Water Company Housing Stock Vintage State of New Jersey

1

41. Q. The Post-Test Year adjustment period in this case ends June 30, 2021. Given
that the declining use trend has been progressing for over two decades, won't
the majority of non-efficient fixtures and appliances already be replaced by
the end of that period?

A. No, as illustrated above, the steady replacement of older fixtures due to remodel or
failure as well as new construction will result in many years to achieve complete
implementation and saturation of fixtures and appliances consistent with the current
efficiency standards. This occurs over a very long period of time as housing stocks
are remodeled and appliances and fixtures wear out, break or become obsolete. As
explained later in my testimony, the decline in usage for the theoretical family of
four indicates a 45-year term to reach total implementation of the current fixture

1		standards and realize the total impact in reduced water usage. As mentioned earlier
2		in my testimony, to date, we have observed an increasing trend of declining
3		residential usage on the NJAWC system for approximately 16 years, leaving
4		another 29 years for further reductions.
5	42. Q.	You have explained the laws and programs that drive the water conservation
6		trend. Can you identify a "real world" example of how these laws and
7		programs actually affect usage per customer?
8	А.	Yes. As a matter of fact, there was a situation in the American Water footprint that
9		demonstrates this phenomenon in a rather dramatic fashion.
10	43. Q.	Please describe it.
11	A.	This phenomenon is illustrated by analyzing usage per customer in the Missouri-
12		American Water Company ("MAWC") Joplin district, before and after the
13		devastating EF5 tornado of May 22, 2011 ("Joplin Tornado"). Although this
14		tornado affected the MAWC service area, the results of my analysis show the real
15		world effects of the replacement of fixtures and appliances and are, thus applicable
16		to New Jersey and NJAWC.
17	44. Q.	Please describe your analysis of the pre- and post-2011 Joplin, MO Tornado
18		residential customer usage.
19	A.	I developed and compared the results of two regression models: the first estimates
20		the trend in base residential usage per Joplin customer for the 10 years leading up
21		to and including 2011; the second model estimates the trend in base residential

1	usage per Joplin customer for the period 2012-2015. By comparing the results of
2	those two regression models, we can see the impact on average residential customer
3	usage due to the rebuilding of housing stock in Joplin to the enhanced water use
4	standards.

5 45. Q. Please describe the statistical results of your analysis of the pre- and post-2011

- 6 Joplin tornado residential customer usage?
- 7 A. The results of the analysis are provided in Table GPR-6, below:

Table GPR-6 Joplin Declining Use Analysis Usage Trend Pre / Post-2011 Tornado

	Prior to	Post
Measure	2011	2011
R-Square	0.820	0.974
Usage Trend	-1.74%	-2.77%

8 Table GPR-6 illustrates the results of the regression analysis of average usage per 9 customer both before and after the Joplin Tornado. It is clear from the statistical 10 results of that regression analysis that the Joplin district's declining usage per 11 customer trend has accelerated because residential customers have rebuilt using 12 water use fixtures that meet or exceed the contemporary water efficiency standards 13 and have replaced older, less efficient fixtures as part of the rebuilding process. 14 The results show that the decline in the base residential usage per customer has 15 increased from an annual rate of approximately -1.7% to approximately -2.8% due 16 to the reconstruction of approximately 2,500 (13.8% of that system) residential 17 dwellings since May 2011 in the Joplin district. This is an approximate 59%

acceleration of the rate of decline in Joplin post May 2011. NJAWC Schedule
 GPR-5 graphically illustrates the acceleration of the trend.

46. Q. What do the results of the analysis of pre- and post-2011 Joplin tornado usage trends reveal about residential customers usage and what does the data imply about future water usage declines?

6 A. The statistical results of the Joplin Tornado analysis, when combined with the 7 results of the four-user energy star analysis detailed in Schedule GPR-3, offer compelling empirical evidence as to the potential scope and duration of continued 8 9 reductions in customer water use patterns. First, as discussed, the rebuilding of 10 homes in the Joplin district resulted in a 59% acceleration of the annual usage per 11 customer reduction from approximately -1.7% to approximately -2.8%. Second, 12 those 2,500 rebuilt customer dwellings experienced an annual usage reduction of 13 approximately 3,200 gallons, or roughly an 8.4% reduction in usage, from their 14 2011 pre-Joplin tornado levels. That 3,200-gallon annual average residential usage 15 reduction by the rebuilt customers is nearly equal to the loss of an entire month's 16 worth of water sales to a typical Joplin residential customer (based on average usage 17 in Joplin post-2011).

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20

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experienced extraordinary reductions in residential water usage resulting in lasting modifications to customer water consumption behavior?

47. Q. Mr. Roach, are there other American Water affiliated companies that have

A. Yes. The trend of California-American Water ("Cal-AM") residential customer
 usage since 2013 both during and post removal of drought related state mandated

1 usage restrictions is one instance in particular that must be noted. In summary, in 2 response to state mandatory 25% water reductions established in June 2015, Cal-3 AM residential usage per customer fell 26% from 2013 annual average levels to 4 2015 annual average levels. Following removal of the state mandated 25% water 5 usage reductions on April 1, 2017, Cal-AM residential usage per customer remains 6 21% lower than the annual average 2013 levels. Hence, 20 months following 7 removal of state mandated water usage reductions, Cal-AM's residential customers 8 have incorporated water conservation behavior such that their water usage remains 9 21% lower than it was in 2013 at the end of 2018. This reflects a real and significant 10 and apparently permanent incorporation of water conservation behavior by Cal-AM 11 customers since 2013. This trend is detailed below in Figure GPR-5 and Table 12 GPR-7, below.



	Table GPR-7							
	California American Water							
Re	sidential	Annual Ave	erage Usag	e Per Custo	mer			
	Ga	allons Per C	Customer N	/lonth				
		Annual	%	Reduction				
	Year	Avg. Usage	of 2013	From 2013				
	2013	10,443						
	2014	9,468	90.7%	-9.3%				
	2015	7,751	74.2%	-25.8%				
	2016	7,685	73.6%	- 26.4 %				
	2017	8,070	77.3%	-22.7%				
	2018	8,237	78.9%	- 21.1%				

1 48. Q. What is your conclusion related to the continuation of reductions in residential

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water usage on the NJAWC system?

3 A. Typically, households replace appliances and fixtures on a sporadic basis, as they 4 break or become obsolete. As they are installed over time, the replacement 5 appliances being more efficient then the originals, result in reductions in usage due 6 to increased efficiency that are spread out over time making it difficult to isolate 7 the impact of any increase in the efficiency of a single appliance or fixture on 8 overall water usage. In contrast, households affected by the Joplin Tornado 9 replaced all of their appliances and fixtures at a single point in time. Therefore, by 10 analyzing the decline in usage in Joplin after the tornado, we can assess the total 11 impact that installation of the most recent, efficient, available technology will have 12 on usage over time. In other words, as NJAWC customers replace their appliances 13 and fixtures, usage on the NJAWC system is likely to decline at the rate I have 14 estimated and potentially up to the rate of usage decline in Joplin following the 15 tornado rebuild. On this basis, and in conjunction with the results of the energy star

1	four user analysis (see Schedule GPR-3), I conclude that residential water use
2	reductions will continue to be significant well into the near future for the NJAWC
3	system. Lastly, the steady year-to-year water use decline attributed to federally
4	mandated water using appliance and fixture usage reductions detailed herein
5	notwithstanding, the permanent effect of state mandated water usage restrictions on
6	Cal-AM residential customers water usage illustrate the potential for significant and
7	dramatic water use reductions in response to state regulated water use restrictions
8	on any of the American Water affiliated systems going forward.
9	AUTHORIZED REVENUE AND DECLINING CONSUMPTION
10	49. Q. The Company is requesting an RSM in this case. Are there reasons why a
11	water company's actual revenue could deviate significantly from its
12	Authorized Revenue?
12 13	Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather,
12 13 14	Authorized Revenue?A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will
12 13 14 15	Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the
12 13 14 15 16	Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the revenue forecast due to cooler and wetter summer weather. Usage per customer
12 13 14 15 16 17	Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the revenue forecast due to cooler and wetter summer weather. Usage per customer results that capture several years of abnormally hot and dry weather will represent
12 13 14 15 16 17 18	 Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the revenue forecast due to cooler and wetter summer weather. Usage per customer results that capture several years of abnormally hot and dry weather will represent usage per customer that simply cannot be achieved in a year of normal weather. In
 12 13 14 15 16 17 18 19 	 Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the revenue forecast due to cooler and wetter summer weather. Usage per customer results that capture several years of abnormally hot and dry weather will represent usage per customer that simply cannot be achieved in a year of normal weather. In addition, the failure of a forecast to capture the full effect of a trend of reduced
 12 13 14 15 16 17 18 19 20 	Authorized Revenue? A. Water utility revenue forecasts are properly based on normal weather. Weather, however, is seldom normal. Therefore there is an equal chance that the utility will exceed the forecast due to abnormally warm and dry weather or fall short of the revenue forecast due to cooler and wetter summer weather. Usage per customer results that capture several years of abnormally hot and dry weather will represent usage per customer that simply cannot be achieved in a year of normal weather. In addition, the failure of a forecast to capture the full effect of a trend of reduced usage per customer will result in the adoption of a faulty forecast that improperly

1		This variability in customer usage patterns and weather can have a substantial effect
2		on a water company's actual revenues. Changes in customer usage patterns can
3		reflect seasonal variation in usage as well long term water use trends (for example
4		as a result of sustained water efficiency and conservation efforts). This is true for
5		NJAWC as well as other water utilities across the country. Although the effect of
6		weather can be random and work either in favor of or against the Company from a
7		financial standpoint, the declining use per customer is another factor, altogether,
8		because customers are using less water every year.
9	50. Q.	Have you analyzed the impact of water usage on NJAWC's actual water sales
9 10	50. Q.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008?
9 10 11	50. Q. A.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008? Yes, I have. NJAWC Schedule GPR-6, page 1 of 2 and Table GPR-8 below,
9 10 11 12	50. Q. A.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008? Yes, I have. NJAWC Schedule GPR-6, page 1 of 2 and Table GPR-8 below, illustrates that NJAWC has collected revenue that is less than the revenue levels
9 10 11 12 13	50. Q. A.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008? Yes, I have. NJAWC Schedule GPR-6, page 1 of 2 and Table GPR-8 below, illustrates that NJAWC has collected revenue that is less than the revenue levels used to set revenue requirements in rate cases since 2009 for each post-case year of
9 10 11 12 13 14	50. Q. A.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008? Yes, I have. NJAWC Schedule GPR-6, page 1 of 2 and Table GPR-8 below, illustrates that NJAWC has collected revenue that is less than the revenue levels used to set revenue requirements in rate cases since 2009 for each post-case year of those proceedings from 2009 to 2018 except for 2015-2017, when sales were driven
9 10 11 12 13 14	50. Q. A.	Have you analyzed the impact of water usage on NJAWC's actual water sales and revenues, as compared to levels authorized for the Company since 2008? Yes, I have. NJAWC Schedule GPR-6, page 1 of 2 and Table GPR-8 below, illustrates that NJAWC has collected revenue that is less than the revenue levels used to set revenue requirements in rate cases since 2009 for each post-case year of those proceedings from 2009 to 2018 except for 2015-2017, when sales were driven by unusually dry and or warmer than average summer climate as visually illustrated

				Table	GPR-8						
New Jersey American Water Company Actual Revenue/Water Sales Compared to Utilized (2000-2014)											
				(2005	2010)						Total
	2000	2010	2011	2012	2012	2014	2015	2016	2017	2019	2000 2019
-	2009	2010	2011	2012	2015	2014	2015	2010	2017	2018	2009-2018
NIMC Total Billod Appual Payapua*	410 460 966	422 109 450	120 676 025	461 167 991	450 704 120	457 476 202	495 070 074	522 721 914	502 294 214	E14 11E 2E0	4 676 940 174
Now Crotal Billed Alindal Revenue	410,403,800	432,130,435	435,070,035	401,102,001	430,704,130	437,420,332	483,370,324	322,731,814	302,384,314	514,115,355	4,070,840,174
Iotal Authorized Revenue**	439,739,115	439,739,115	454,158,610	467,686,598	473,360,865	4/3,360,865	479,895,096	501,344,725	501,344,725	516,018,955	4,746,648,670
Revenue Recovery to Authorized (Under)/Over	(29,269,249)	(7,540,656)	(14,482,575)	(6,523,717)	(22,656,735)	(15,934,473)	\$6,075,828	\$21,387,089	\$1,039,589	(\$1,903,596)	(\$69,808,496
	-6.66%	-1.71%	-3.19%	-1.39%	-4.79%	-3.37%	1.27%	4.27%	0.21%	-0.37%	-1.479
NJWC Total Annual Water Sales (000 Gallons)	62,198,523	68,349,122	63,430,775	63,855,472	60,752,397	61,405,819	64,430,499	63,682,367	61,401,684	60,648,710	630,155,367
Total Authorized Water Sales*	68,557,095	68,557,095	65,194,420	64,517,922	64,234,167	64,234,167	63,324,154	60,336,896	60,336,896	60,340,356	639,633,168
Water Sales to Authorized (Under)/Over	(6,358,572)	(207,973)	(1,763,645)	(662,450)	(3,481,770)	(2,828,348)	1,106,345	3,345,471	1,064,788	308,354	(9,477,801
	-9.27%	-0.30%	-2.71%	-1.03%	-5.42%	-4.40%	1.75%	5.54%	1.76%	0.51%	-1.48%
											Average
											2009-2018
Annual Cooling Degree Days	791	1,285	1,218	1,142	1,029	869	1,051	1,233	1,014	1,249	1,08
Percipitation June-Sept	17.7	8.9	24.4	11.7	9.5	9.0	6.6	10.9	11.1	17.5	12.
*GMS only Exclusive of DSIC and Surcharge and C	ther Water Reve										

*GMS only. Exclusive of DSIC and Surcharge and Other Water Revenue **GMS only. Per Commission Orders Exclusive of Other Water Revenue

1	significantly from Authorized Revenue. Specifically, for the period of 2009
2	through 2018, NJAWC realized actual revenues that combined were approximately
3	\$69.8 million less than those revenue used to establish rates. Similarly, for that
4	same period, NJAWC realized total water sales that were approximately 9.477
5	billion gallons less than used to establish rates. There is direct linkage between the
6	inability of NJAWC to collect this revenue level over the period of 2009-2018 and
7	water usage reductions attributed to the 9.477 billion-gallon short fall in total sales
8	levels utilized in the NJAWC cases over the period of 2009 through 2018.
9	51. O. Has NJAWC factored the observed trend of declining residential and
2	crew a mus morth o metorea the observed trend of accounting restactions and
10	commercial customer usage into its pro-forma revenues in this case?
11	A. Yes. Company witness Mr. Rea addresses the development of NJAWC's revenue
12	requirement and pro-forma revenues at present rates, including the Post-Test Year
13	adjustment period data to reflect the observed trend of declining usage for
14	residential and commercial customers. Moreover, as I explained, this trend is not
15	going to abate for many years and so it will continue throughout the Post-Test Year
16	adjustment period and beyond. This is important because, if the RSM is instituted
17	to operate beyond the Post-Test Year adjustment period to ensure that the Company
18	continues to collect its authorized revenue, the Company will not have to file a rate
19	case simply to recover the revenue shortfall due to the trend of declining use per
20	customer.

52. Q. Are there other benefits to an RSM besides maintaining the level of revenue authorized by the BPU?

1	A. Yes, by decoupling revenue from usage, the Company avoids the so-called
2	"conservation conundrum" wherein it is rewarded for higher sales and punished for
3	lower sales. This allows the Company to embrace fully the wise use of water and
4	to support the conservations programs promoted by this State.

5 53. Q. Have the Company's customers received any benefits from their reduced water usage?

A. Yes. Our customers share in various environmental and operational benefits from 7 8 lower water usage. For example, reduced usage helps maintain source water 9 supplies, lessening diversions from supply sources, leaving more water for passing 10 flows or drought reserve. Reductions in power consumption, chemical usage, and 11 waste disposal not only reduce water utility operating costs, but also provide 12 environmental benefits such as reduced carbon footprint from lower power usage 13 for treatment and pumping and reduced waste streams. Reduced water usage by 14 customers also reduces energy consumption within the customer's home, for 15 instance, through lower hot water heating needs. In addition, on a case-specific 16 basis, reduced water usage has the potential to enable the utility to delay or 17 downsize a capacity addition. In systems where demand is approaching the 18 capacity of water supplies or treatment facilities, the water saved through efficient 19 usage by customers can be a preferred alternative to a supply-side expansion, with 20 a resulting lower cost to customers. Over the long term, reduced usage per 21 residential customer has helped lower operating costs, and has helped avoid some

1	capacity-related needs. These savings and avoided costs have benefitted customers
2	through the ratemaking process.

54. Q. Can declining usage and water conservation activities result in certain avoided capital costs?

A. Yes. Reductions in water usage can avoid the need to build supply, treatment, and transmission facilities to meet those now avoided additional usage demands. The impact of reduced usage per customer on supply and large transmission investment notwithstanding, the ongoing decline of usage per customer does not delay nor mitigate the on-going need for NJAWC to continue replacing its aging distribution infrastructure in order to continue providing its customers with reliable and safe drinking water.

12 55. Q. Please summarize why a RSM makes sense for NJAWC and its customers.

13 A. As the data show, the Company's revenue is affected by two distinct matters. First, 14 the variability of weather and, second, the trend of declining use per customer. The 15 RSM removes the unpredictability of weather from the rate equation, providing that 16 the Company collects its Authorized Revenue, no more and no less. The RSM 17 will also allow NJAWC to continue to collect those Authorized Revenue following 18 the expiration of the first year that rates are in effect. Given the demonstrated 19 potential for the trend of declining use per residential and commercial customers to 20 continue for many years, the implementation of an RSM will mean that NJAWC 21 would not have to file for base rate relief solely to recover the revenue shortfall due

1	to this trend.	For all of the	nese reasons,	an RSM	is in	the best	interest	of all
2	stakeholder, the	Company, its	s customers ar	nd the Sta	te of N	New Jerse	y.	

3 56. Q. Does this conclude your direct testimony?

4 A. Yes it does.

Appendix A

1	Professional Experience of Gregory P. Roach
2	I have over 25 years of experience working in the electric, gas and water utility
3	sectors as both a consultant and utility employee, beginning with Public Service
4	Indiana (now Duke Energy) in January 1980, where my responsibilities were
5	focused on transforming PSI's load forecasting processes from time series to
6	econometric based models. In May 1982, I accepted the position of Senior
7	Economist with the management-consulting firm of R. W. Beck and Associates
8	("Beck") (now part of Science Applications International Corporation, "SAIC"). I
9	received numerous promotions through my career with Beck to the eventual
10	position of Principal Economist. During my career at Beck, I was responsible for
11	the management of all rates/regulatory, load forecasting and financing feasibility
12	client engagements managed by the Indianapolis office. As such, I delivered
13	testimony on behalf of agency, municipal and co-op clients throughout the United
14	States related to cost of service, rate design, load forecasting, system planning,
15	electric and gas production plant economic feasibility, revenue requirement pro-
16	forma adjustments, production cost optimization and cost of capital to state
17	regulatory commissions and the Federal Energy Regulatory Commission.

In May 1991 I took the position of Principal Economist with the regulatory management consulting firm of SVBK Consulting Group ("SVBK") (now part of Alliant Energy Integrated Services, "Alliant"). In that position, I was responsible for all consulting engagements executed from the Indianapolis regional office on

Appendix A

1	behalf of SVBK's national utility clients. In addition to the regulatory matters that
2	I testified to while at SVBK, I offered testimony related to merger & acquisition
3	cost reductions/synergies, large power pool generation and transmission dispatch
4	strategies, power pool generation/transmission pricing schemes, price elasticity
5	sales adjustments and retail rate impact of specific power/transmission pooling cost
6	minimization arrangements and payments.
7	In July 1993, I became owner and president of a retail operations holding company
8	with three franchise store outlets. In that position, I was responsible for all
9	management, operation, sales and financial functions of the firm.
10	In November 1998, I sold the retail holding company to begin operations of the
11	Roach Consulting Group, Ltd as Principal Consultant. In that position I advised
12	industrial and utility clients related to business intelligence systems,
13	enterprise/manufacturing resource planning systems, customer information
14	systems as well as general accounting systems. I also appeared as an expert witness
15	providing testimony related to economic and punitive damages in personal injury
16	and wrongful death legal proceedings. In July 2011, I joined the Service Company
17	as Manager of Rates and Regulation, supporting Indiana-American and Michigan-
18	American Water Company. In August 2014, I accepted the position of Manager of
19	Revenue Analytics with the Service Company. In November 2017, I was promoted
20	to the position of Senior Manager of Revenue Analytics with the Service Company.

Appendix B

Glossary of Technical and Statistical Terms

1

Autocorrelation - Autocorrelation is a characteristic of data in which the correlation between the values of the same variables is based on related objects. Informally, it is the similarity between observations as a function of the time lag between them. In regression modeling, the estimate errors follow a pattern, showing that something is wrong with the regression model. ... If this assumption is violated and the error term observations are correlated, autocorrelation is present.

- 8 **Cooling Degree Day** ("CDD") A cooling degree day (CDD) is a measurement designed 9 to quantify the demand for energy needed to cool a building. It is the number of degrees 10 that a day's average temperature is above 65° Fahrenheit (18° Celsius), which is the 11 temperature above which buildings need to be cooled. Annual CDD would be the sum of 12 all CDD occurring in a calendar year.
- 13 **Durbin-Watson Statistic** The Durbin Watson statistic is a number that tests for 14 autocorrelation in the residuals from a statistical regression analysis. The Durbin-Watson 15 statistic is always between 0 and 4. A value of 2 means that there is no autocorrelation in 16 the sample.
- F-Statistic The F value is the ratio of the mean regression sum of squares divided by the
 mean error sum of squares. Its value will range from zero to an arbitrarily large number.
 The value of Probability (F) is the probability that the null hypothesis for the full model is
 true (i.e., that all of the regression coefficients are zero). The higher the F value, the
 greatest confidence that the null hypothesis can be rejected.
- Heating Degree Day ("HDD") A heating degree day (HDD) is a measurement designed to quantify the demand for energy needed to heat a building. It is the number of degrees that a day's average temperature is below 65 ° Fahrenheit (18 ° Celsius), which is the temperature below which buildings need to be heated. Annual HDD would be the sum of all HDD occurring in a calendar year.
- **R-Squared** In statistics, the coefficient of determination, denoted R2 or r2 and
 pronounced "R squared", is the proportion of the variance in the dependent variable that is
 predictable from the independent variable(s).
- T- Statistic The t statistic is the coefficient divided by its standard error. The standard error is an estimate of the standard deviation of the coefficient, the amount it varies across cases. It can be thought of as a measure of the precision with which the regression coefficient is measured. The higher the t statistic, the greater probability is that the regression coefficient has been estimated precisely.

American Water Works Company Residential Water Usage Forecasts Based on 10 year history Based on Weather Normalized Trends except where noted below

	Annual Decline (GPCY)	Rate of Decline (%)
State	10-year (2009-2018)	10-year (2009-2018)
Illinois	-1,368	-2.8%
Indiana	-965	-2.0%
Iowa	-879	-1.9%
Kentucky	-1,046	-2.2%
Maryland	-740	-1.7%
Missouri	-1,529	-2.1%
New Jersey*	-1,203	-1.8%
Pennsylvania	-871	-2.1%
Tennessee	-643	-1.4%
Virginia	-733	-1.4%
West Virginia	-576	-1.5%
Weighted Average	-1,095	-2.0%

Notes:

California & Michigan used three year average per customer

New York is aligned to Revenue Stabilization Mechanism

New Jersey based on 10 years ending June, 2019

Weighted average based on 2018 average residential customer connections

The following regulations are listed in the "*Energy Independence* & *Security Act of 2007,*" Public Law 110–140 – Dec. 19, 2007:

- 1. A top-loading or front-loading standard-size residential clothes washers manufactured on or after January 1, 2011 shall have a water factor of not more than 9.5. (water factor is equal to gallons/cycle/cubic feet)
- 2. Dishwashers manufactured on or after January 1, 2010, shall
 - a. for standard size dishwashers (≥ 8 place settings + six serving pieces) not exceed **6.5 gallon per cycle**; and
 - b. for compact size dishwashers (< 8 place settings + six serving pieces) not exceed **4.5 gallons per cycle**.

		••			
Type of Use	Pre- Regulatory Flow*	New Standard (maximum)	Federal Standard	Year Effective	WaterSense / ENERGY STAR Current Specification+ (maximum)
Toilets	3.5 gpf	1.6 gpf	U.S. Energy Policy Act	1994	1.28 gpf
Clothes washers**	41 gpl (14.6 WF)	Estimated 26.6 gpl (9.5 WF)	Energy Independence & Security Act of 2007	2011	Estimated 16.8 gpl (6.0 WF)
Showers	2.75 gpm	2.5 gpm	U.S. Energy Policy Act	1994	2.0 gpm
Faucets***	2.75 gpm	2.5 gpm (1.5 gpm)	U.S. Energy Policy Act	1994	1.5 gpm at 60 psi
Dishwashers	14.0 gpc	6.5 gpc for standard; 4.5 gpc for compact	Energy Independence & Security Act of 2007	2010	4.25 gpc for standard; 3.5 gpc for compact
Commercial Pre Rinse Spray Valves	1.8 to 6 gpm	1.6 gpm	U.S. Energy Policy Act of 2005	2006	1.28 gpm

TABLE 1 Flow rates from typical fixtures and appliances before and after Federal Standards

* Source: Handbook of Water Use and Conservation, Amy Vickers, May 2001

** Average estimated gallons per load and water factor (see calculations)

*** Regulation maximum of 2.5 gpm at 80 psi, but lavatory faucets available at 1.5 gpm maximum (see calculations)

+Source: http://www.epa.gov/watersense/ and http://www.energystar.gov websites

	ABBREVIATIONS USED							
gpcd	gallons per capita per day							
gpf	gallons per flush							
gpl	gallons per load							
gpm	gallons per minute							
gpc	gallons per cycle							
WF	water factor, or gallons per cycle per cubic feet capacity of the washer (the							
	smaller the water factor, the more water efficient the clothes washer)							

TABLE 2

Daily indoor per capita water use from various fixtures and appliances in a typical single family home before and after Federal Regulations

	Pre- Regulatory Standards Amount**	Post- Regulatory Standards Amount**		Water Sense/ Energy Star Amount**	
Type of Use	(gpcd)	(gpcd)	Savings from Pre- Reg	(gpcd)	Additional Savings from Post-Reg
Toilets	17.9	8.2	54%	6.5	21%
Clothes washers*	15	9.8	35%	6.2	37%
Showers	9.7	8.8	9%	7.1	19%
Faucets	14.9	10.8	28%	8.1	25%
Dishwashers*	1.4	0.65	54%	0.43	34%
Total Indoor Water Use	58.9	38.3	35%	28.3	26%

Note: List only includes common household fixtures and appliances and excludes leaks and "other domestic uses" in order to be conservative.

*Regulatory Standards effective in 2010 and 2011. For calculations of amount in gpcd, refer to the calculation below.

**Source: Handbook of Water Use and Conservation, Amy Vickers, May 2001

CALCULATIONS

Clothes washer (pre-regulatory):	= 0.37 loads per day
Number of times clothes washer used everyday *	= 39 gpl to 43 gpl
Clothes washer water use rate range *	= 41 gpl
Average water use rate	= 41 gpl * 0.37 loads/day
Water usage per capita	= 15 gpcd
Water factor (WF) as gallons/cycle/cu. ft	 = 41 gpl / 2.8 cu. ft (assuming capacity of an average washer to be 2.8 cu. ft, most washers range between 2.7 – 2.9 cu. ft) = 14.6
Clothes washer (new standard):	= 0.37 loads per day
Number of times clothes washer used everyday *	= 9.5 WF
New regulatory standard	= 9.5 gallons/per cycle/cubic feet

	 = 26.6 gpl (Assuming capacity of an average washer to be 2.8 cu. ft, most washers range between 2.7 = 2.9 cu. ft)
Therefore, new usage per capita	= 26.6 gpl * 0.37 loads/day = 9.8 gpcd
Clothes washer (WaterSense/Energy Star): Number of times clothes washer used everyday * New regulatory standard	 = 0.37 loads per day = 6 WF = 6 gallons/per cycle/cubic feet = 26.6 gpl (Assuming capacity of an average washer to be 2.8 cu. ft,
Therefore, new usage per capita	most washers range between 2.7 – 2.9 cu. ft) = 16.8 gpl * 0.37 loads/day = 6.2 gpcd
Dishwasher:	
Number of times dishwasher used everyday* New regulatory standard	= 0.10 times = 6.5 gallons/per cycle (for standard disbwashers only)
Therefore, new usage per capita	= 6.5 gallons/per cycle * 0.1 = 0.65 gpcd
Dishwasher (WaterSense/Energy Star):	
Number of times dishwasher used everyday* New regulatory standard	 = 0.10 times = 4.25 gallons/per cycle (for standard dishwashers only)
Therefore, new usage per capita	= 4.25 gallons/per cycle * 0.1 = 0.43 gpcd
Faucet: Actual faucet flow during use* Rated flow* Frequency of faucet use* Range of usage per capita Assume average of range for estimated apod	 = 67% rated flow = 1.5 gpm to 2.5 gpm = 8.1 min/day = 8.1 gpcd to 13.5 gpcd = 10.8 gpcd
Faucet (WaterSense/Energy Star):Actual faucet flow during use*Rated flow*Frequency of faucet use*Usage per capitaAssume average of range for estimated gpcd	= 67% rated flow = 1.5 gpm = 8.1 min/day = 8.1 gpcd = 8.1 gpcd

*Source: Handbook of Water Use and Conservation, Amy Vickers, May, 2001

Adap	<u>ted from informatio</u>	n provided by the U.S. E	PA Office of Water, th	he Alliance for Water L	Efficiency, and othe	er sources)	
Fixtures and	EPAct 1992, EPAct 2005, "Energy Independence and Security Act of 2007" (or backlog NAECA updates)		WaterSense [®]	WaterSense [®] or Energy Star [®]		Consortium for Energy Efficiency	
Appliances	Current Standard	Proposed/Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed/Future Specification	
Residential Toilets	1.6 gpf ¹	1.28 gpf/ 4.8 Lpf proposed by efficiency advocates for tank-type only	Tank-type toilets: WaterSense = 1.28 gpf (4.8L) with at least 350 gram waste removal + LA Spec.		No specification		
Residential Lavatory (Bathroom) Faucets	2.2 gpm at 60 psi ²	1.5 gpm/ 5.7 Lpm proposed by efficiency advocates	WaterSense = 1.5 gpm maximum & 0.8 gpm minimum at 20 psi		No specification		
Residential Kitchen Faucets				None proposed at this time	No specification		
Residential Showerheads	2.5 gpm at 80 psi		WaterSense = 2.0 gpm		No specification		
Residential Clothes Washers	MEF ≥ 1.26 ft ³ /kWh/cycle *No specified water use factor Note: MEF measures energy consumption of the total laundry cycle (wash + dry). The higher the number, the greater the energy efficiency	Energy Independence and Security Act of 2007 specified effective in 2011: MEF ≥ 1.26 ft ³ /kWh/cycle WF ≤ 9.5 gal/cycle/ft ³ Also specified: DOE shall publish final rule by Dec 31, 2011, determining if standards will change effective 1/1/2015.	Energy Star (DOE) effective July 1, 2009: MEF ≥ 1.8 ft ³ /kWh/cycle WF ≤ 7.5 gal/cycle/ ft ³	Energy Star (DOE) To be effective Jan 1, 2011: MEF ≥ 2.0 WF ≤ 6.0 gal/cycle/ft ³	Tier 1: MEF \geq 1.80 ft ³ /kWh/cycle; WF \leq 7.5 gal/cycle/ft ³ Tier 2: MEF \geq 2.00 ft ³ /kWh/cycle; WF \leq 6.0 gal/cycle/ft ³ Tier 3: MEF \geq 2.20 ft ³ /kWh/cycle; WF \leq 4.5		

¹ EPAct 1992 standard for toilets applies to both commercial and residential models.

DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992

EPAct 2005: Energy Policy Act of 2005

EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance

NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



² EPAct 1992 standard for faucets applies to both commercial and residential models.

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Fixtures and	EPAct 1992, El Independence and (or backlog	PAct 2005, "Energy d Security Act of 2007" <i>NAECA updates)</i>	WaterSense	or Energy Star [®]	Consortium for Energy Efficiency	
Appliances	Current Standard	Proposed/Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed/Future Specification
Standard Size and Compact Residential Dishwashers ³	Standard models: Energy Independence and Security Act of 2007 specified: effective 1/1/2010: Standard Size: 355 KWh/year (.62 EF + 1 watt standby) WF \leq 6.5 gallons/cycle Compact Size: 260 kWh WF \leq 4.5 gallons/cycle EF is the number of cycles the machine can run for each kWh of electricity	Also specified by the Act: DOE shall publish final rule by 1/1/2015 determining if dishwasher standards will change effective 1/1/2018.	Energy Star (DOE) Effective since July 1, 2009 Standard Size: 324 kWh/year WF ≤ 5.8 gallons/cycle Compact Size: 234 kWh/year WF ≤ 4.0 gallons/cycle kWH/yr is replacing EF since it includes the cycles the machine can run for each kWh, but also includes up to 8 kWh/yr of standby power (when the machine isn't cycling)	Energy Star effective July 1, 2011: Standard Size: 307 kWh/yr 5.0 gallons per cycle Compact Size: 222 kWh/yr 3.5 gallons per cycle	Effective Aug. 11, 2009: Standard models: EF; maximum kWh/year Tier 1: EF ≥ 0.72 cycles/kWh; and 307 max kWh/year; 5.0 gallons per cycle Tier 2: EF ≥ 0.75 cycles/kWh; 295 max kWh/year; 4.25 gallons per cycle Compact models: Tier 1: EF ≥ 1.0 cycles/kWh; 222 max kWh/year; 3.5 gallons per cycle	Could adjust Tiers after July 1, 2011 when new Energy Star becomes effective

National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances Page 5 of 12 Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)

DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005

EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



³ Standard models: capacity is greater than or equal to eight place settings and six serving pieces; Compact models: capacity is less than eight place settings and six serving pieces

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Fixtures and	EPAct 1992, EPAct 2005 (or backlog NAECA updates)		WaterSense	Consortium for Energy Efficiency		
Appliances	Current Standard	Proposed/ Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed /Future Specification
Commercial Toilets	1.6 gpf ⁴ /6.0 Lpf Except blow-out fixtures: 3.5-gpf/13 Lpf Note: Some states prohibit blow-out at 3.5 gpf	1.28 gpf/ 4.8 Lpf proposed by efficiency advocates for tank-type only	Tank-type only: WaterSense at 1.28 gpf (4.8L) with at least 350 gram waste removal + LA Spec.	Flushometer valve/ bowl combinations: WaterSense specification in development. No release date promised.	No specification	
Commercial Urinals	1.0 gpf	0.5 gpf/ 1.9 Lpf proposed by efficiency advocates	WaterSense = 0.5 gpf/1.9Lpf (flushing urinals only)		No specification	
Commercial Faucets	 Private faucets: 2.2 gpm at 60 psi⁵ Public Restroom faucets: 0.5 gpm at 60 psi⁵ Metering (auto shut of) faucets: 0.25 gallons per cycle⁶ 			WaterSense draft specification now under consideration	No specification	

⁶ Metering faucets not subject to flow rate maximum

- DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005
- EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute

gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



⁴ EPAct 1992 standard for toilets applies to both commercial and residential models.

⁵ In addition to EPAct requirements, the American Society of Mechanical Engineers standard for public lavatory faucets is 0.5 gpm at 60 psi (ASME A112.18.1-2005). This maximum has been incorporated into the national Uniform Plumbing Code and the International Plumbing Code for all except private applications, private being defined as residential, hotel guest rooms, and health care patient rooms. All other applications subject to the 0.5 gpm/1.9 Lpm flow rate maximum.

National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances Schedule GPR-2 Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)

Fixtures and	EPAct 1992, EPAct 2005 (or backlog NAECA updates)		WaterSense	Consortium for Energy Efficiency		
Appliances	Current Standard	Proposed/ Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed /Future Specification
Commercial Clothes Washers (Family-sized)	MEF ≥ 1.26 ft ³ /kWh; WF ≤ 9.5 gal/cycle/ft ³	New standards under development: DOE scheduled final action: January 2010; Rulemaking process postponed by DOE in 2008; began again in Dec. 2009.	Energy Star (DOE) MEF ≥ 1.72 ft ³ /kWh/cycle; WF ≤ 8.0 gal/cycle/ft ³		Adopted Jan 1, 2007 (Note: this spec covers only normal capacity family washers, NOT large capacity commercial washers) Tier 1: 1.80 MEF 7.5 gal/cycle/ft ³ Tier 2: 2.00 MEF 6.0 gal/cycle/ft ³ Tier 3: 2.20 MEF 4.5 gal/cycle/ft ³	

DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005 EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



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Fixtures and	EPAct 1992, E (or backlog NA	EPAct 2005 ECA updates)	WaterSense [®] or Energy Star [®]		Consortium for Energy Efficiency	
Appliances	Current Standard	Proposed/ Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed /Future Specification
Commercial Dishwashers	No standard		Energy Star (EPA) using NSF/ANSI standards for water use and ASTM standards for energy use Effective 10/11/2007		No specification	
			Under counter:			
			Hi Temp: 1.0 gal/rack; <= 0.90 kW; Lo Temp 1.70 gal/rack <= 0.5 kW			
			Stationary Single Tank Door:			
			Hi Temp: 0.95 gal/rack; <= 1.0 kW			
			Lo Temp: 1.18 gal/rack; <= 0.6 kW			
			Single Tank Conveyor:			
			Hi Temp: 0.70 gal/rack; <= 2.0 kW;			
			Lo Temp: 0.79 gal/rack; <= 1.6 kW			
			Multiple Tank Conveyor:			
			Hi Temp: 0.54 gal/rack; <= 2.6 kW			
			Lo Temp: 0.54 gal/rack;			
			<= 2.0 kW			

DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005 EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann Page 5



National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances Schedule GPR-2 Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)

Fixtures and	EPAct 1992, EPAct 2005 (or backlog NAECA updates)		WaterSense	Consortium for Energy Efficiency		
Appliances	Current Standard	Proposed/ Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed /Future Specification
Automatic Commercial Ice Makers ⁷	Effective 1/1/2010: Energy and condenser water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table)		Energy Star (EPA) Energy and water efficiency standards vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table). <u>Water cooled machines excluded</u> <u>from Energy Star</u>		Energy and water (potable and condenser) standards are tiered and vary by equipment type on a sliding scale depending upon harvest rate and type of cooling (see link to additional information at end of this table)	
Commercial Pre-rinse Spray Valves (for food service appli- cations)	Flow rate ≤ 1.6 gpm (no pressure specified; no performance requirement)		No specification	Proposed Energy Star specification abandoned after standard established in EPAct 2005; WaterSense specification in development in conjunction with Energy Star	No specification (program guidance recommends 1.6 gpm at 60 psi and a cleanability requirement)	

⁷ Optional standards for other types of automatic ice makers are also authorized under EPAct 2005.

- DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005
- EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute

gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance

NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



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AppliancesCurrent StandardProposed/ Future StandardCurrent SpecificationProposed/Future SpecificationProposed/Future SpecificationProposed /Future SpecificationCommercial Steam Cookers8No standardEnergy Star (EPA)Energy Star (EPA)Electric: 50% Cooking energy efficiency; idle rate 400–800 WattsElectric: 50% Cooking energy efficiency; idle rate 400–800 WattsCooking energy efficiency; idle rate 400–800 WattsCooking energy efficiency; idle rate 6,250- 12,500 British thermal units/hourGas: 38% cooking energy efficiency; idle rate 6,250- 12,500 British thermal units/hourGas: 38% cooking energy efficiency; idle rate 6,250- 12,500 British thermal units/hourWattsVater Use FactorFactorWater Use Factor (for both electric and gas models):Vater Use Factor (for both electric and gas models):Tier 18: v 16Hord Vater UseTier 18: v 16	Fixtures and	EPAct 1992, EPAct 2005 (or backlog NAECA updates)		WaterSense [®] o	Consortium for Energy Efficiency		
Commercial Steam Cookers ⁸ No standard Energy Star (EPA) Electric: 50% cooking energy efficiency; idle rate 400–800 Watts Cooking energy efficiency; idle rate 400–800 Watts Gas: 38% Gas: 38% cooking energy efficiency; idle rate 6,250– 12,500 British thermal units/hour Gas: 38% Gooking energy efficiency; idle rate 6,250– 12,500 British thermal units/hour Gas: 38% Watt Watts Water use factor Water Use Factor (for both electric and gas models): Water Use Factor (for both electric and gas models):	Appliances	Current Standard	Proposed/ Future Standard	Current Specification	Proposed/Future Specification	Current Specification	Proposed /Future Specification
≤ 4 gal/hr	Commercial Steam Cookers ⁸	No standard		Energy Star (EPA) <i>Electric</i> : 50% cooking energy efficiency; idle rate 400–800 Watts <i>Gas</i> : 38% cooking energy efficiency; idle rate 6,250– 12,500 British thermal units/hour *No specified water use factor		Electric: 50% cooking energy efficiency; idle rate 400–800 Watts Gas: 38% cooking energy efficiency; idle rate 6,250– 12,500 British thermal units/hour Water Use Factor (for both electric and gas models): Tier 1A: ≤ 15 gal/hr Tier 1B: ≤ 4 gal/hr	

⁸ Idle rate standards vary for 3-, 4-, 5-, and 6-pan commercial steam cooker models.

- DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005
- EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute

gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Lpf: Litres per flush Koeller/Dietemann



Schedule GPR-2 National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances Page 11 of 12 Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)

Information/materials on EPAct 2005/NAECA standards:

Schedule for development of appliance and commercial equipment efficiency standards: http://www.eere.energy.gov/buildings/appliance_standards/2006_schedule_setting.html

Commercial Clothes Washers and Dishwashers (agenda/presentations at 4/27/06 DOE public meeting on rulemaking): http://www.eere.energy.gov/buildings/appliance standards/residential/home appl mtg.html

Automatic Commercial Ice Maker Standards:

http://www.eere.energy.gov/buildings/appliance standards/pdfs/epact2005 appliance stds.pdf (Page 18)

Pre-rinse Spray Valves

http://www.eere.energy.gov/buildings/appliance standards/pdfs/epact2005 appliance stds.pdf (Page 10)

Information/materials on WaterSense specifications:

Toilets http://www.epa.gov/watersense/products/toilets.html

Urinals http://www.epa.gov/watersense/products/urinals.html

Bathroom Lavatory Faucets http://www.epa.gov/watersense/products/bathroom sink faucets.html

Information/materials on Energy Star specifications:

Residential Clothes Washers http://www.energystar.gov/index.cfm?c=clotheswash.pr crit clothes washers

Commercial Clothes Washers http://www.energystar.gov/index.cfm?fuseaction=clotheswash.display_commercial_cw

Residential Dishwashers http://www.energystar.gov/index.cfm?c=dishwash.pr dishwashers

Commercial Dishwashers http://www.energystar.gov/index.cfm?c=new_specs.comm_dishwashers

Automatic Commercial Ice Makers http://www.energystar.gov/index.cfm?c=new specs.ice machines

DOE: Department of Energy **EPA: Environmental Protection Agency** EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005

EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute

gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance

NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Koeller/Dietemann Lpf: Litres per flush



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Adapted from information provided by the U.S. EPA Office of Water, the Alliance for Water Efficiency, and other sources)

Commercial Steam Cookers http://www.energystar.gov/index.cfm?c=steamcookers.pr steamcookers

Information/materials on CEE specifications:

Residential Clothes Washers http://www.cee1.org/resid/seha/rwsh/rwsh-main.php3

Residential Dishwashers http://www.cee1.org/resid/seha/dishw/dishw-main.php3

Commercial, Family-Sized Clothes Washers http://www.cee1.org/com/cwsh/cwsh-main.php3

Commercial Ice-Makers http://www.cee1.org/com/com-ref/ice-main.php3; Spec Table: http://www.cee1.org/com/com-kit/ice-specs.pdf

Pre-rinse Spray Valves http://www.cee1.org/com/com-kit/prv-guides.pdf

Commercial Steam Cookers http://www.cee1.org/com/com-kit/sc-hc-specs.pdf

DOE: Department of Energy EPA: Environmental Protection Agency EPAct 1992: Energy Policy Act of 1992 EPAct 2005: Energy Policy Act of 2005

EF: energy factor ft³: cubic feet gal: gallons gpm: gallons per minute gpf: gallons per flush kWh: kilowatt hour MEF: modified energy factor MaP: maximum performance

NAECA: National Appliance Energy Conservation Act psi: pounds per square inch WF: water factor Updated March 2010 Koeller/Dietemann Lpf: Litres per flush



New Jersey American Water Co. Reasonableness of Consumption Decline Calculation 1,203 Gallons Per Customer Per Year

Illustrating: Replacement of Clothes Washing, Toilet, Fixtures and Dishwashers Based on Family of Four

Washer:			
Old: Usage per load - gallons	41	Average Use Per Capita Per Day	0.37
New: Usage per load - gallons	17	Average Loads per week - 4 People	10
Usage decline	24	Savings per week	251
		Savings per year - Gallons	13,037

Toilet:			
Old: Usage per flush - gallons	3.5	Flush per person per day	5
New: Usage per flush - gallons	1.3	Household number	4
Usage decline	2.2		
		Flush per day per household	20
		Flush per year per household	7,300
		Savings per year - Gallons	16,206

Fixtures (Showers):			
Old: Gallons/min flow	2.75	Flow Minutes Per Person Day	8
New: Gallons/min flow	2.00	Household Number	4
Usage Decline	0.75		
		Total Flow Minutes Per Day	32
		Total Flow Savings Per Day	24
		Savings per year - Gallons	8,870

Fixtures (Faucets):			
Old: Gallons/min flow	2.75	Flow Minutes Per Person Day	8
New: Gallons/min flow	1.50	Household Number	4
Usage Decline	1.25		
		Total Flow Minutes Per Day	32
		Total Flow Savings Per Day	41
		Savings per year - Gallons	14,783

Dish Washer:			
Old: Gallons/cycle	14	Average Use Per Capita Per Day	0.10
New: Gallons/cycle	4	Average Loads per week - 4 People	3
Usage decline	10	Savings per week	27
		Savings per year - Gallons	1,420

Total Impact of All Appliances:

Total Calculated Annual NJAWC Decrease in Usage @ 1,203 ppcy (Gallons)	705,446,418
Divided by: Total Estimate Water Usage Savings For Family of Four (Gallons)	54,315
Implied Number of Toilet, Clothes Washer, Fixture and Dish Washer Changes	
Accounting For Annual Usage Reduction NJAWC (Number of Customers)	12,988
NJAWC - Average Number of Residential Customers (2016)	586,406
Maximum number of Customers in a single year contributing to decline	2.21%
Implied Years For Complete Impact of Appliance Replacement	45

*1 Source: Handbook of Water Use and Conservation, Amy Vickers, May, 2001

*2 Source: www.home-water-works.org, A project of the Alliance for Water Efficency, 2011.

Census	FactFin	der 🔾	MISSOUR	Feedback	< FAQs Glossary Help
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Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities, and towns and estimates of housing units for states and counties.

A processing error was found in the Year Structure Built estimates since data year 2008. For more information, please see the errata note #110.

Verbial out units Subject Percent Margin of Error Percent Margin of Error 2017 Total housing units 3,969,065 +/-/.01 3,969,065 +//.01 3,969,065 +//.02 2016 2016 3,999,011 +/-/.02 8,969,065 +//.02 8,969,065 +//.02 1.00 +/02 2016 2016 3,999,011 +/02 1.00 (X) (X) 2011 2012 Homeowner vacanor rate 5.5 +/-0.2 (X) (X) 2012 2011 UNITS IN STRUCTURE 0 (X) (X) (X) 2011 2011 Jainit, attached 337,149 +/-4.28 (X) (X) 2011 Jainit, attached 337,149 +/-4.28 (X) (X) (X) 2011 Jainit, attached 337,149 +/-4.28 (X) (X) (X) 2011 Jainit, attached 337,149 +/-4.28 (X) (X) (X) 2011 Jainit, attached 337,149 </th <th>Varaiana of this</th> <th></th> <th></th> <th>w Jersey</th> <th colspan="3">ersey</th>	Varaiana of this			w Jersey	ersey		
HOUSING OCCUPANCY Sec. 2017 355,055 ++1.051 3,555,055 (N) 2016 320,54 ++1.051 3,555,055 (N) 2014 320,54 ++1.051 3,555,055 (N) 2014 320,54 ++1.051 3,555,055 (N) 2012 2014 320,54 ++1.051 3,555,055 (N) 2012 2014 20,557 ++1.051 3,555,055 (N) (N) 2011 2010 UNITS IN STRUCTURE 1 1 (N) (N) 2011 2010 UNITS IN STRUCTURE 3,595,055 (V) (N) 2011 2010 1-unit, distabled 1,928,527 +4,541 3,595,055 (V) 1-unit, distabled 1,928,527 +4,544 6,445 +4,041 2-units 3,3391 +4,3465 6,445 +4,041 10 to 19 units 172,064 +4,2305 4,946 +4,041 10 to 19 units 170,006 +4,011	table are available	1	Subject	Estimate	Margin of Error	Percent	Percent Margin of Error
2017 143 Total housing units 3,595,055 ++1,051 3,595,055 (×) 2016 Occupied housing units 3,199,111 ++7,584 80.96 ++0.22 2013 Quital Ausanth housing units 3199,111 ++7,631 11.0% ++0.22 2014 Quital Ausanth housing units 3199,111 ++7,631 11.0% ++0.22 2013 Rental vacancy rate 5.5 ++0.22 (X) (X) 2011 Quital Ausanthy rate 5.5 ++0.22 (X) (X) 2010 UNITS IN STRUCTURE	vears.	of	HOUSING OCCUPANCY				
2017 Occupied Tousing units 3199,111 ++7.594 89.0% ++/-0.2 2015 395,944 +6.831 11.0% ++/-0.2 2014 2013 395,944 +6.831 11.0% ++/-0.2 2012 2013 55 +/-0.1 (X) (X) 2014 2015 -+/-0.2 (X) (X) 2015 55 +/-0.2 (X) (X) 2016 UNITS IN STRUCTURE		143	Total housing units	3,595,055	+/-1,051	3,595,055	(X)
Vacant housing units 395,944 ++6,831 11.0% ++0.22 2013 Homeowner vacancy rate 1.7 ++0.1 (X) (X) 2011 2011 5.5 ++0.02 (X) (X) 2011 2011 5.5 ++0.01 (X) (X) (X) 2011 2011 2011 2011 3.595,055 ++1.015 3.595,055 (X) (X) (X) 2010 UNITS IN STRUCTURE 5 4+0.41 5.36% ++0.01 2011 1.1.0% 4+2.3041 9.5% ++0.01 2011 2.0.11% 3.0.4 +4.2.3461 9.5% ++0.01 2011 3.0.4 4.0.1 1.0.9% ++0.01 2.0.0% ++0.01 2010 10.10.19 units 373.391 ++1.087 0.4% ++0.01 2010 nors units 373.391 ++1.087 0.4% ++0.01 200 or more units 373.391 ++1.087 0.4% ++0.01	2017	8	Occupied housing units	3,199,111	+/-7,594	89.0%	+/-0.2
2014 2013 2012 2011 2010 Homeowner vacancy rate 1.7 H-0.1 (X) (X) WINTS IN STRUCTURE 5.5 +/-0.2 (X) (X) UNITS IN STRUCTURE 3,595,055 +/-1.01 3,595,055 (X) 1-unit, attached 1,928,527 +/-5.414 53,5% (Y-0.1) 1-unit, attached 341,204 +/-3.001 9,5% +/-0.01 2 units 337,149 +/-4.286 9,4% +/-0.11 3 or 4 units 21,044 +/-2,301 4,8% +/-0.11 2 or more units 33,3301 +/-1.85 10.4% +/-0.11 2 or orne units 33,3301 +/-1.85 10.4% +/-0.11 2 or orne units 33,3301 +/-1.85 10.4% +/-0.11 2 or orne units 33,3301 +/-1.85 10.4% +/-0.11 2 or more units 33,3301 +/-1.85 10.4% +/-0.11 Boat, RV, van, etc. 685 +/-1.18 3.565,055 (X) Built 2014 or iater 21.897 <td>2016</td> <td></td> <td>Vacant housing units</td> <td>395,944</td> <td>+/-6,831</td> <td>11.0%</td> <td>+/-0.2</td>	2016		Vacant housing units	395,944	+/-6,831	11.0%	+/-0.2
2013 2012 2011 2010 Homeowner vacancy rate 1.7 ++0.1 (X) (X) 2012 2011 2010 Rental vacancy rate 5.5 ++0.2 (X) (X) 2011 2010 UNITS IN STRUCTURE Total nousing units 3,595,055 ++1.051 3,595,055 +(X).1 1-unit, detached 1,122,527 ++5.414 53.6% ++0.11 1-unit, detached 1,229,527 ++5.414 53.6% ++0.11 2-units 337,149 ++4.266 9.4% ++0.11 3 or 4 units 231,044 ++3.346 6.4% ++0.11 10 to 19 units 177,064 ++2.2301 4.8% ++0.11 2.0 or more units 373.391 ++1.3165 10.4% ++0.11 2.0 or more units 373.391 ++1.82 0.0% ++0.01 Boat, RV, van, etc. 665 ++1.051 3.695,055 (X) VEAR STRUCTURE BUILT	2015		Ŭ				
2013 2011 2010 Rental vacancy rate 5.5 +/-0.2 (K) (K) 2011 2010 UNITS IN STRUCTURE ////////////////////////////////////	2014		Homeowner vacancy rate	1.7	+/-0.1	(X)	(X)
2011 2010 1000 1000 1000 2011 2010 UNITS IN STRUCTURE Total housing units 3.595,055 +/-1,051 3.595,055 (X) 1-unit, detached 1.928,527 +/-5,414 53.696 +/-0,011 2 units 337,149 +/-4,246 9.4% +/-0,01 3 or 4 units 231,044 +/3,446 6.4% +/-0,01 5 to 9 units 172,161 +/-2,293 4.9% +/-0,01 10 to 19 units 172,161 +/-2,293 4.9% +/-0,01 20 or more units 33,330 +/-1,017 0.9% +/-0,01 Mobile home 33,330 +/-1,017 0.9% +/-0,01 Boat, RV, van, etc. 685 +/-1,02 0.0% +/-0,11 Built 2014 or later 21,997 +/-923 0.6% +/-0,11 Built 2010 to 2013 51,013 +/-1,524 1.4% +/-0,01 Built 190 to 1999 341,793 +/-3,772 9.5% +/-0,01 Built 190 to 1999 344,731 1.9%	2013		Rental vacancy rate	5.5	+/-0.2	(X)	(X)
2010 UNITS IN STRUCTURE Description State Description Description <thdescription< th=""> <thdescription< th=""> D</thdescription<></thdescription<>	2012						
Z010 Total housing units 3,595,055 ++1,051 3,595,055 ++1,051 1-unit, detached 1,282,527 ++5,414 53,6% ++0,11 1-unit, attached 337,149 ++4,206 9,4% ++/-0,11 2 units 337,149 ++4,206 9,4% ++/-0,11 3 of 4 units 231,044 ++3,346 6,4% ++/-0,11 5 to 9 units 177,161 ++2,205 4,8% ++/-0,11 20 or more units 373,391 ++3,165 10,4% ++/-0,11 Mobile home 33,830 ++1,087 0.9% ++/-0,11 Mobile home 33,830 ++1,087 3,555,55 (X) Buil 2010 to 2013 51,031 ++1,824 1,4% +/-0,11 Buil 2010 to 2013 51,031 ++1,8772 9,3% +/-0,11 Buil 1200 to 2009 34,967 ++3,841 9,3% +/-0,11 Buil 1900 to 1999 34,173 ++3,272 9,3% +/-0,11 Buil 1900 to 1999 547,177	2011		UNITS IN STRUCTURE				
1-unit, detached 1,28,27 +/-5,414 53,6% +/-0.1 1-unit, attached 341,204 +/3,091 9.5% +/-0.1 2 units 337,149 +/-4,266 9.4% +/-0.1 3 or 4 units 231,044 +/-2,301 4.5% +/-0.1 1 to 15 9 units 172,161 +/-2,301 4.5% +/-0.1 1 to 15 9 units 177,064 +/-2,305 4.9% +/-0.1 20 or more units 373,381 +/-3.165 10.4% +/-0.1 Mobile home 33,303 +/-1.165 0.9% +/-0.1 Boat, RV, van, etc. 665 +/-1.82 0.0% +/-0.1 YEAR STRUCTURE BULT	2010		Total housing units	3,595,055	+/-1,051	3,595,055	(X)
1-uni, attached 341,204 +/-3,201 9.5% +/-0.1 2 units 337,149 +/-4,266 0.4% +/-0.1 3 or 4 units 231,044 +/-3,446 6.4% +/-0.1 5 to 9 units 172,161 +/-2,335 4.9% +/-0.1 20 or more units 373,391 +/-3,165 10.4% +/-0.1 20 or more units 373,391 +/-3,165 10.4% +/-0.1 Mobile home 33,830 +/-1,87 0.9% +/-0.1 Boat, RV, van, etc. 685 +/-187 0.9% +/-0.1 Total housing units 3,595,055 +/-1051 3,595,055 (X) Buit 2014 or later 21,977 +/-3,281 1.4% +/-0.1 Buit 2010 to 2009 334,957 +/-3,3061 11.9% +/-0.1 Buit 1980 to 1989 247,942 +/-3,441 9.3% +/-0.1 Buit 1980 to 1989 247,942 +/-3,484 12.8% +/-0.1 Buit 1980 to 1989 486,259 +/-4,447 12.8% +/-0.1 Buit 1980 to 1989 289,846 +/-2,988 </td <td></td> <td></td> <td>1-unit, detached</td> <td>1,928,527</td> <td>+/-5,414</td> <td>53.6%</td> <td>+/-0.1</td>			1-unit, detached	1,928,527	+/-5,414	53.6%	+/-0.1
2 units 337,149 +4,266 9,4% +4/-0.1 3 or 4 units 231,044 ++3,466 6,4% +/-0.1 5 to 9 units 172,161 +/-2,301 4,8% +/-0.1 10 to 19 units 177,064 +/-2,935 4,9% +/-0.1 20 or more units 373,391 ++3,165 10,4% +/-0.1 Mobile home 33,830 +/-1,087 0.9% +/-0.1 Boat, RV, van, etc. 365 +/-182 0.9% +/-0.1 YEAR STRUCTURE BUILT 555,055 (X) Built 2014 or later 21,897 ++923 0.6% +/-0.1 Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 -/-0.1 Built 2001 to 2009 334,973 +-3,772 9.5% +/-0.1 Built 1900 to 1999 341,793 +-4,424 13.5% +/-0.1 Built 1900 to 1999 458,582 +/-4,444 13.5% +/-0.1 Built 1900 to 1999 458,582 +/-4,444 13.5% +/-0.1 Built 1900 to 1999 458,582 +/-4,444 13.5% +/-0.1			1-unit, attached	341,204	+/-3,091	9.5%	+/-0.1
3 or 4 units 231,044 +/-3,446 6.4% +/-0.1 5 to 9 units 172,161 +/-2,301 4.8% +/-0.1 10 to 19 units 373,391 +/-3,165 10.4% +/-0.1 20 or more units 373,391 +/-3,165 10.4% +/-0.1 Mobile home 33,830 +/-1.182 0.0% +/-0.1 Boat, RV, van, etc. 685 +/-1.82 0.0% +/-0.1 YEAR STRUCTURE BUILT 685 +/-1.82 0.0% +/-0.1 Built 2014 or later 21,897 +/-1.52 1.4% +/-0.1 Built 2010 to 2013 51,031 +/-1.52 1.4% +/-0.1 Built 2010 to 2013 34.957 +/-3.841 9.3% +/-0.1 Built 1990 to 1999 341.793 +/-3.72 9.5% +/-0.1 Built 1990 to 1999 427.942 +/-3.806 11.9% +/-0.1 Built 1990 to 1999 427.942 +/-3.806 11.9% +/-0.1 Built 1990 to 1999 547.187 +/-4.47 13.5% +/-0.1 Built 1950 to 1959 547.187 +/-4			2 units	337,149	+/-4,266	9.4%	+/-0.1
5 to 9 units 172,161 +/-2,301 4.8% +/-0.1 10 to 19 units 177,064 +/-2,335 4.9% +/-0.1 20 or more units 373,391 +/-2,165 10.4% +/-0.1 Mobile home 33,830 +/-1,087 0.9% +/-0.1 Boat, RV, van, etc. 685 +/-182 0.0% +/-0.1 VEAR STRUCTURE BUILT 685 +/-1021 3,595,055 (X) Built 2014 or later 21,897 +/-1,824 0.6% +/-0.1 Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 1999 341,793 +/-3,772 9.5% +/-0.1 Built 1990 to 1999 341,793 +/-3,806 11.9% +/-0.1 Built 1990 to 1999 341,793 +/-3,806 11.9% +/-0.1 Built 1990 to 1999 547,147 +/-447 12.8% +/-0.1 Built 1900 to 1969 486,259 +/-447 12.8% +/-0.1 Built 1900 to 1969 547,147 +/-447 15.2% +/-0.1 Built 1900 to 1969 547,147 <			3 or 4 units	231,044	+/-3,446	6.4%	+/-0.1
10 to 19 units 177,064 +/-2,935 4.9% +/-0.1 20 or more units 373,391 +/-3,165 10.4% +/-0.1 Mobile home 33,380 +/-1.087 0.9% +/-0.1 Boat, RV, van, etc. 665 +/-182 0.0% +/-0.1 YEAR STRUCTURE BUILT 665 +/-1051 3,595,055 (X) Built 2014 or later 21,897 +/-1,524 0.6% +/-0.1 Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 2009 334,997 +/-3,841 9,3% +/-0.1 Built 1900 to 1989 341,793 +/-3,772 9,5% +/-0.1 Built 1990 to 1989 427,942 +/-3,806 11.9% +/-0.1 Built 1990 to 1989 427,942 +/-3,806 11.9% +/-0.1 Built 1990 to 1989 447,942 15.2% +/-0.1 Built 1990 to 1989 547,187 +/-4,479 15.2% +/-0.1 Built 1990 to 1989 547,187 +/-4,478 15.2% +/-0.1 Built 1990 to 1959 547,187 +/-4,478<			5 to 9 units	172,161	+/-2,301	4.8%	+/-0.1
20 or more units 373,391 +/-3,185 10.4% +/-0.1 Mobile home 33,800 +/-1,087 0.9% +/-0.1 Boat, RV, van, etc. 685 +/-182 0.0% +/-0.1 YEAR STRUCTURE BUILT 685 +/-1051 3,595,055 (X) Built 2014 or later 21,897 +/-923 0.6% +/-0.1 Built 2010 to 2009 334,957 +/-3,841 9.3% +/-0.1 Built 1990 to 1999 341,793 +/-3,881 9.3% +/-0.1 Built 1990 to 1999 341,793 +/-3,881 9.3% +/-0.1 Built 1990 to 1999 341,793 +/-3,881 9.3% +/-0.1 Built 1990 to 1999 427,942 +/-3.86 11.9% +/-0.1 Built 1990 to 1999 427,942 +/-3.86 11.9% +/-0.1 Built 1990 to 1999 427,942 +/-3.86 11.9% +/-0.1 Built 1900 to 1969 465,582 +/-4.477 12.8% +/-0.1 Built 1950 to 1959 547,187 +/-4.479 15.2% +/-0.1 Built 1930 earlier 655,561<			10 to 19 units	177,064	+/-2,935	4.9%	+/-0.1
Mobile home 33,830 +/-1,187 0.9% +/-0.1 Boat, RV, van, etc. 685 +/-182 0.0% +/-0.1 YEAR STRUCTURE BUILT 50 50 (X) Built 2014 rolater 3,595,055 +/-1,051 3,595,055 (X) Built 2014 rolater 21,897 +/-923 0.6% +/-0.1 Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 2009 334,957 +/-3,841 9.3% +/-0.1 Built 1980 to 1989 427,942 +/-3,860 11.9% +/-0.1 Built 1980 to 1989 427,942 +/-3,860 11.9% +/-0.1 Built 1970 to 1979 458,582 +/-4,424 13.5% +/-0.1 Built 1960 to 1989 486,259 +/-4,424 13.5% +/-0.1 Built 1960 to 1949 269,846 +/-2,989 7.5% +/-0.1 Built 1930 or earlier 655,561 +/-0,964 18.2% +/-0.1 Total nousing units 3,595,055 +/1,151 <			20 or more units	373,391	+/-3,165	10.4%	+/-0.1
Boat, RV, van, etc. 665 +/-182 0.0% +/-0.1 YEAR STRUCTURE BUILT </td <td></td> <td></td> <td>Mobile home</td> <td>33,830</td> <td>+/-1,087</td> <td>0.9%</td> <td>+/-0.1</td>			Mobile home	33,830	+/-1,087	0.9%	+/-0.1
YEAR STRUCTURE BUILT Image: margin base in the structure base in the s			Boat, RV, van, etc.	685	+/-182	0.0%	+/-0.1
YEAR STRUCTURE BUILT Total housing units 3,595,055 +/-1,051 3,595,055 (X) Built 2014 or later 21,897 +/-9,23 0.6% +/-0.1 Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 2009 334,957 +/-3,841 9.3% +/-0.1 Built 1900 to 1999 341,793 +/-3,876 11.9% +/-0.1 Built 1900 to 1989 447,942 +/-3,806 11.9% +/-0.1 Built 1900 to 1989 458,582 +/-4,487 12.8% +/-0.1 Built 1900 to 1969 458,582 +/-4,447 12.8% +/-0.1 Built 1960 to 1969 547,187 +/-4,248 13.5% +/-0.1 Built 1960 to 1949 569,561 +/-4,390 7.5% +/-0.1 Built 1930 or earlier 655,561 +/-3,964 18.2% +/-0.1 Total housing units 3,595,055 +/-1,151 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 3,595,055 +/-1,1718 2.1% +/-0.1							
Total housing units 3,599,055 +/-1,051 3,599,055 (*/-1,051) Built 2014 or later 21,897 +/-1,254 1.4% +/-0.1 Built 2010 to 2013 51,031 +/-1,254 1.4% +/-0.1 Built 2000 to 2009 334,957 +/-3,841 9.3% +/-0.1 Built 1990 to 1999 341,793 +/-3,772 9.5% +/-0.1 Built 1980 to 1989 427,942 +/-4,487 12.8% +/-0.1 Built 1970 to 1979 458,582 +/-4,447 12.8% +/-0.1 Built 1960 to 1969 486,259 +/-4,447 12.8% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1940 to 1949 269,866 +/-2,989 7.5% +/-0.1 Built 1939 or earlier 2 5561 +/-3,964 18.2% +/-0.1 ROOMS 3,595,055 (X) 1 1 3,595,055 (X) 1 room 3,288 +/-2,003 2.3% +/-0.1 4 +/-0.1 2 rooms 365,580 +/-3,388 10.2%			YEAR STRUCTURE BUILT				
Built 2014 or later 21,897 +/-923 0.6% +/-0.1 Built 2010 to 2010 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 2009 334,957 +/-3,841 9.3% +/-0.1 Built 1900 to 1999 341,793 +/-3,772 9.5% +/-0.1 Built 1980 to 1989 427,942 +/-3,806 11.9% +/-0.1 Built 1970 to 1979 458,582 +/-4,447 12.8% +/-0.1 Built 1960 to 1969 486,259 +/-4,447 12.8% +/-0.1 Built 1950 to 1959 547,187 +/-4,447 13.5% +/-0.1 Built 1950 to 1959 547,187 +/-4,447 13.5% +/-0.1 Built 1950 to 1949 269,846 +/-2,989 7.5% +/-0.1 Built 1940 to 1949 269,846 +/-2,989 7.5% +/-0.1 ROOMS			Total housing units	3,595,055	+/-1,051	3,595,055	(X)
Built 2010 to 2013 51,031 +/-1,524 1.4% +/-0.1 Built 2000 to 2009 334,957 +/-3,871 9.5% +/-0.1 Built 1990 to 1999 341,793 +/-3,872 9.5% +/-0.1 Built 1980 to 1989 427,942 +/-3,806 11.9% +/-0.1 Built 1970 to 1979 458,582 +/-4,487 12.8% +/-0.1 Built 1960 to 1969 486,259 +/-4,474 13.5% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1930 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS 70al housing units 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,888 10.5% +/-0.1 4 rooms 551,012 +/-4,479 16.3% +/-0.1 5 rooms 606,675			Built 2014 or later	21,897	+/-923	0.6%	+/-0.1
Built 2000 to 2009 334,957 +/-3,871 9.3% +/-0.1 Built 1990 to 1999 341,793 +/-3,872 9.5% +/-0.1 Built 1980 to 1989 427,422 +/-3,806 11.9% +/-0.1 Built 1970 to 1979 458,582 +/-4,447 12.8% +/-0.1 Built 1960 to 1969 486,259 +/-4,424 13.5% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1930 or earlier 655,561 +/-3,964 18.2% +/-0.1 Built 1939 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS			Built 2010 to 2013	51,031	+/-1,524	1.4%	+/-0.1
Built 1980 to 1999 341,793 +/-3,772 9.5% +/-0.1 Built 1980 to 1989 427,942 +/-3,806 11.9% +/-0.1 Built 1970 to 1979 458,582 +/-4,487 12.8% +/-0.1 Built 1960 to 1969 486,259 +/-4,487 15.2% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1930 or earlier 269,846 +/-2,989 7.5% +/-0.1 Built 1939 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS 7001 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,800 +/-3,808 16.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,479 16.2% +/-0.1 6 rooms 581,199 +/-5,088 16.2% +/-0.1			Built 2000 to 2009	334,957	+/-3,841	9.3%	+/-0.1
Built 1980 to 1989 427,942 +7-3,806 11.9% +7-0.1 Built 1970 to 1979 458,582 +/-4,487 12.8% +/-0.1 Built 1960 to 1969 468,259 +/-4,424 13.5% +/-0.1 Built 1950 to 1959 547,187 +/-4,424 13.5% +/-0.1 Built 1930 to 1949 269,846 +/-2,989 7.5% +/-0.1 Built 1930 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS room 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,383 10.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,494 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			Built 1990 to 1999	341,793	+/-3,772	9.5%	+/-0.1
Built 1960 to 1979 436,362 +/-4,47 12.5% +/-0.1 Built 1960 to 1969 486,259 +/-4,424 13.5% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1940 to 1949 269,846 +/-2,989 7.5% +/-0.1 Built 1939 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS 701 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,102 +/-4,479 15.3% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,479 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			Built 1980 to 1989	427,942	+/-3,806	11.9%	+/-0.1
Built 1960 to 1969 440,239 +/-4,424 13.3% +/-0.1 Built 1950 to 1959 547,187 +/-4,479 15.2% +/-0.1 Built 1940 to 1949 269,846 +/-2,989 7.5% +/-0.1 Built 1930 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS 70tal housing units 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,888 10.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,088 16.2% +/-0.1			Built 1970 to 1979	406,062	+/-4,407	12.0%	+/-0.1
Built 1950 to 1959 547,187 +7/-4,479 15.2% +7/-0.1 Built 1940 to 1949 269,846 +7/-2,989 7.5% +7/-0.1 Built 1930 or earlier 655,561 +7/-3,964 18.2% +7/-0.1 ROOMS 7000 82,288 +7/-2,003 2.3% +7/-0.1 1 room 82,288 +7/-2,003 2.3% +7/-0.1 2 rooms 75,914 +7/-1,718 2.1% +7/-0.1 3 rooms 365,800 +7/-3,838 10.2% +7/-0.1 4 rooms 551,012 +7/-4,479 15.3% +7/-0.1 5 rooms 606,675 +7/-9,494 16.9% +7/-0.1 6 rooms 581,199 +7/-5,089 16.2% +7/-0.1			Duilt 1900 to 1909	400,209	+/-4,424	13.5%	+/-0.1
Built 1940 to 1949 205,040 +7/2,999 7/3% +7/-0.1 Built 1939 or earlier 655,561 +/-3,964 18.2% +/-0.1 ROOMS 5 5 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,838 10.2% +/-0.1 4 rooms 551,102 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			Built 1950 to 1959	247,107	+/-4,479	15.2%	+/-0.1
ROOMS 1/-5,304 1/0,274 1/0,274 1 room 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0,1 2 rooms 75,914 +/-1,718 2.1% +/-0,1 3 rooms 365,800 +/-3,838 10.2% +/-0,1 4 rooms 551,012 +/-4,479 15.3% +/-0,1 5 rooms 606,675 +/-4,499 16.9% +/-0,1 6 rooms 581,199 +/-5,088 16.2% +/-0,1			Built 1940 to 1949 Built 1930 or earlier	209,040	+/-2,909	18 2%	+/-0.1
ROOMS			Built 1939 of earlier	033,301	17-3,904	10.270	+/-0.1
Total housing units 3,595,055 +/-1,051 3,595,055 (X) 1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,800 +/-3,838 16.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,499 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			ROOMS				
1 room 82,288 +/-2,003 2.3% +/-0.1 2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,838 10.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,494 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			Total housing units	3,595,055	+/-1,051	3,595,055	(X)
2 rooms 75,914 +/-1,718 2.1% +/-0.1 3 rooms 365,580 +/-3,838 10.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			1 room	82,288	+/-2,003	2.3%	+/-0.1
3 rooms 365,580 +/-3,838 10.2% +/-0.1 4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,088 16.2% +/-0.1			2 rooms	75,914	+/-1,718	2.1%	+/-0.1
4 rooms 551,012 +/-4,479 15.3% +/-0.1 5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			3 rooms	365,580	+/-3,838	10.2%	+/-0.1
5 rooms 606,675 +/-4,949 16.9% +/-0.1 6 rooms 581,199 +/-5,089 16.2% +/-0.1			4 rooms	551,012	+/-4,479	15.3%	+/-0.1
6 rooms 581,199 +/-5,089 16.2% +/-0.1			5 rooms	606,675	+/-4,949	16.9%	+/-0.1
			6 rooms	581,199	+/-5,089	16.2%	+/-0.1
/ rooms 449,904 +/-3,573 12.5% +/-0.1			7 rooms	449,904	+/-3,573	12.5%	+/-0.1
8 rooms 370,796 +/-3,598 10.3% +/-0.1			8 rooms	370,796	+/-3,598	10.3%	+/-0.1

American FactFinder - Results

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Media neoms 5.7 4+0.1 (V) (EEDROOKS - </th <th>9 rooms or more</th> <th>511.687</th> <th>+/-4.691</th> <th>14.2%</th> <th>+/-0.</th>	9 rooms or more	511.687	+/-4.691	14.2%	+/-0.
BEDROOMS Full 3.40000 Full 3.40000 Totel housing units 3.40000 +14.00 3.40000 +14.00 3.40000 1 backnown 0.014.00 +4.000 3.40000 +4.430 3.5000 +4.430 3.5000 3 backnown 0.014.00 +4.000 -4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 3.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.430 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 +4.440 5.500 <td< td=""><td>Median rooms</td><td>5.7</td><td>+/-0.1</td><td>(X)</td><td>(X</td></td<>	Median rooms	5.7	+/-0.1	(X)	(X
BERNOUSS Image: State in the second sec					
Total housing units 9,89,066 -11.08 9,89,065 -11.488 2,89,065 -11.488 2,89,005 -11.488	BEDROOMS				
No bedroom 88,300 -+1.498 2.5% ++4.438 1 bedroom 691,721 +4.438 3.3% ++4.438 2 bedrooms 691,821 +4.438 3.3% ++4.438 4 bedrooms 698,000 ++2.900 3.3% ++4.438 4 bedrooms 698,000 ++2.900 5.5% ++4.900 Cocupies Housing units 2.369,111 ++1.907.00 8.4.1% ++4.900 Average household size of remes cocupied unit 2.28 ++4.001 QX)	Total housing units	3,595,055	+/-1,051	3,595,055	(X
1 Section 51 A72 +14.337 31.473 +14.4378 32.5% +44.4378 2 bedrooms 11.15377 +42.578 32.5% +44.4378 3 of doctors 11.15377 +42.578 32.5% +44.4378 5 or more bedrooms 699.595 ++2.599 5.5% +44.44 Cocupled housing units 3.99,111 +17.264 3.199,111 (1.157.38) Arrenge household size of ranker-accupied unit 2.26 +10.400 44.001 (0) (0) YEAR HOUSEHOLDER MOVED INTO UNIT 2.55 -10.010 (0) (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111 (1.157.564 3.159,111	No bedroom	88,360	+/-1,946	2.5%	+/-0.
2 Betrioms 941,807 +1-4,379 32.5% +4-4 3 Bedrioms 693,907 ++2,379 62.5% +4-4 5 or more bedrooms 699,809 ++2,379 62.5% +4-4 HOLSING TENURE 2,359,111 +-7,554 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 +7,754 3,159,111 (C) (C)<	1 bedroom	501,473	+/-4,332	13.9%	+/-0.
3 batrooms 1,174,017 ++5,270 32,78 ++4,420 5 or more bedrooms 198,980 ++2,290 5,55 ++4 Ocupied nousing unts 3,99,111 ++7,540 3,55 ++4 Orange bousing unts 2,992,173 ++14,540 35,55 ++4 Average household size of owner-occupied unit 2,284 ++4,001 (0) (0) (0) YEAR HOUSEHOLDER MOVED INTO UNIT 2,250,014 ++2,354 3,199,111 + - Occupied nousing unts 2,390,114 ++7,545 3,199,111 + + + Moved in 200 to 2010 2010 to 2010 10,0105 + + + + Moved in 200 to 2010 10,0105 515,827 +<	2 bedrooms	941,607	+/-5,379	26.2%	+/-0.1
4 betrooms 688.802 +/-4.801 19.2% +/-4.901 6 sormone bedrooms 198.802 +/-4.801 5.5% +/-4 HOUSIN ENURE 2.952.073 +/-10.470 84.1% +/ Obsequest house units 2.952.073 +/-10.470 84.1% +/ Renter-occupied 1147.038 ++-5.590 ++/-4 Average household size of owner-occupied unit 2.24 +/-0.01 (X) (X) Cocoped housing units 3.199.111 +/-7.594 3.199.111 (X) Cocoped housing units 3.199.111 +/-7.594 3.199.111 (X) Moved in 1000 to 1090 1001.006 +/-5.593 7.4% 4/- Moved in 1090 to 1690 1011.27 +/-4.593 8.7% 4/- Moved in 1090 to 1690 1012.006 +/-4.593 11.4% 4/- Cocoped housing units 3.199.111 (-/-7.594 3.199.111 (-/-7.594 Cocoped housing units 3.199.111 (-/-7.594 3.199.111 (-/-7.594 Cocoped housing units 3.199.111 (-/-7.594 3.199.111 (-/-7.594 VEHICES AVAILABLE -/-7.594 3.199.111 (-/-7.594 3.199.111 (-/-7.594 Cocopead housing units	3 bedrooms	1,174,917	+/-5,790	32.7%	+/-0.
Sorman bedrooms 198,86 #-2.299 5.5% *-4 HOUSING TENURE 0.00pct housing infis 3.190,111 *-4.7.294 3.190,111 ** Average housing units 2.157,794 3.190,111 **	4 bedrooms	689,802	+/-4,920	19.2%	+/-0.
HOLSING TENERE 1	5 or more bedrooms	198,896	+/-2,939	5.5%	+/-0.
Docuging Animag units 3 199.111 -17.284 3 199.11					
Owner-occupied 2.052.073 4/1.02470 64.1% 4/4 Renter-occupied 1.147.038 4/4.580 35.9% 4/4 Average household size of owner-occupied unit 2.24 4/2.011 (X) (X) (X) VEAR HOUSEHOLDER MOVED INTO UNIT 255.04 4/2.234 8.1% +4/4 Moved in 2015 or tater 256.044 4/2.234 8.1% +4/4 Moved in 2010 a 2010 2010 a 2010 100.050 +4/5.68 8.1% +4/4 Moved in 2010 a 2010 100.100 +4/5.68 8.1% +4/4 Moved in 100 bas 10 1889 555.05 ++7.2471 8.2% +4/4 Moved in 1979 and earlier 255.565 ++7.2471 9.2% +4/4 VEHICLES AVAILABLE 10.666.11 11.4% +4/4 4/4 4/4 Occupied housing units 3.199.111 +4/7.564 3.199.111 +4/7.564 3.199.111 +4/4 VEHICLES AVAILABLE 2.286.106 +4/6.173 3.199.111 +4/7.564 3.199.111 +4/7.564 <t< td=""><td>Occupied housing units</td><td>3 199 111</td><td>+/-7 594</td><td>3 199 111</td><td>()</td></t<>	Occupied housing units	3 199 111	+/-7 594	3 199 111	()
Renter-occupied 1.147.038 ++6.890 35.9% ++6 Average household size of owner-occupied unit 2.84 ++0.01 (X) (C) VEAR HOUSEHOLDER MOVED INTO UNIT 2.87 ++0.01 (X) (C) (C) Moved in 2016 to 2014 3.199.111 +/7.594 3.199.111 (C) (C) Moved in 2016 to 2014 876.162 +/6.933 27.3% +/4.4 Moved in 1800 to 1999 1.01.095 +/6.583 27.4% +/4.4 Moved in 1800 to 1999 2.95.17 +/2.4681 16.0% +/4.4 Moved in 1800 to 1999 2.95.17 +/2.4681 16.0% +/4.4 Moved in 1875 and earlier 2.95.66 +/2.471 9.2% +/4.4 VENCLSS AVALIABLE -/2.4871 3.199.111 +/7.594 3.199.111 +/7.594 Cocupied housing units 5.199.111 +/7.684 3.199.111 +/7.684 3.199.111 +/7.684 Cocupied housing units 2.385.108 +/7.381 1.9% +/4.4564 1.9% +/4.4564 <td>Owner-occupied</td> <td>2.052.073</td> <td>+/-10.470</td> <td>64.1%</td> <td>+/-0.</td>	Owner-occupied	2.052.073	+/-10.470	64.1%	+/-0.
Average household size of owner-occupied unit 2.64 4+0.01 (X) (X) Average household size of renter-occupied unit 2.57 ++0.01 (X) (X) VEAR HOUSEHOLDER MOVED INTO UNIT 0 0 0 (X) (X) Cocuped household size of renter-occupied unit 3/198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.198.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.111 +/-7.504 3.199.1111 +/-7.504 3.199.111	Renter-occupied	1,147,038	+/-5.890	35.9%	+/-0.
Average household size of emer-occupied unit 2.84 ++0.01 (X) (C) VEAR HOUSEHOLDER MOVED INTO UNIT		.,,			,
Average household size of renter-occupied unit 2.57 +/-0.01 (K) YEAR HOUSEHOLDER MOVED INTO UNIT Cocupied housing units 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,595 +/-7,292 */-7,292 */-7,292 */-7,292 */-7,293 1,99,111 +/-7,595 +/-7,293 1,99,111 +/-7,595 +/-7,293 1,99,111 +/-7,595 +/-7,292 */-7,292 */-7,292 */-7,293 1,99,111 +/-7,793 1,99,111 +/-7,793 1,99,111 +/-7,793 1,99,111 +/-7,793 1,99,111 +/-7,793 1,99,111 +/-7,795 +/-7,795 +/-7,795 +/-7,795	Average household size of owner-occupied unit	2.84	+/-0.01	(X)	()
YEAR HOUSEHOLDER MOVED INTO UNIT Image: constraint of the second se	Average household size of renter-occupied unit	2.57	+/-0.01	(X)	()
PEAR MODES NULLER NOTON 3.199.111 +7.534 3.1911 47.534 3.1911					
Comparing 2015 to theory 0.560,044 77,023 27,45 74,42 Moved in 2020 to 2020 107,023 27,45 74,44 Moved in 2020 to 2020 111,02 +14,530 113,05 +14,4531 Moved in 1920 to 1920 to 1920 1511,227 +12,286 8,05 +14,4531 Moved in 1920 to 1920 and cartier 2561,227 +2,286 8,05 +14,4531 VEHICLES AVAILABLE 0.09,111 +17,7584 3,199,111 +7,7584 3,199,111 +17,4584 1,191,11 +17,4594		3 100 111	+/ 7 50/	3 100 111	()
Moved in 2010 & and in the interval of the interval	Moved in 2015 or later	3,199,111	+/ 2 024	0,199,111	+/ 0
Moved in 2008 to 2009 100,108 +7.568 31.3% +44 Moved in 1980 to 1999 511.22 +4.581 16.0% +44 Moved in 1980 to 1999 255.22 +4.581 16.0% +44 Moved in 1979 and earlier 255.58 +4.421 9.2% +44 Moved in 1979 and earlier 255.58 +4.421 9.2% +44 Cocupied housing units 3,199,111 +7.7584 3,199,111 +4 No whicles available 304,686 +4.647 34.3% +4.647 2 whicles available 106,118 +4.647 34.3% +4.647 3 or more whicles available 519,935 +4.647 34.3% +4.647 HOUSE HEATING FUEL Cocupied housing units 3,199,111 +7.7584 3,199,111 +7.7584 3,199,111 +7.7584 3,199,111 +7.7584 >1.9% +4.64 Bottled, tark, or LP gas 2,395,108 +7.464 12.4% +7.738 3,199,111 +7.7584 3,199,111 +7.7584 3,199,111 +7.7584 <t< td=""><td>Moved in 2010 to 2014</td><td>239,044</td><td>+/-2,934</td><td>0.170</td><td>+/-0.</td></t<>	Moved in 2010 to 2014	239,044	+/-2,934	0.170	+/-0.
Moved in 1980 to 1999 11.227 +7-0.099 13.29 +7-4 Moved in 1980 to 1999 55.12.27 +7.2.861 8.0% +7-4 Moved in 1980 to 1999 55.58 +7-2.863 8.0% +7-4 Moved in 1980 to 1999 55.58 +7-2.863 8.0% +7-4 VEHICLES AVAILABLE 364,060 +7-7.544 3.199,111 (No vehicles available 1,165,192 +7-6.467 3.2.99,111 +7-7.544 3.1	Moved in 2010 to 2019	1 001 005	+/ 5 550	21.470	+/-0.
moves in 1990 in 1999 511.627 +1/-2,286 80,0% +1/-4 Moved in 1979 and earlier 255.127 +1/-2,886 80,0% +1/-4 VEHICLES AVAILABLE 258.86 +1/-2,471 9,2% +1/-4 Occupied housing units 3,199,111 +1/-7,564 3,199,111 +1/-7,564 Occupied housing units 1,096,118 +1/-8,467 3,2% +1/-4 2 vehicles available 1,096,118 +1/-7,564 3,2% +1/-4 A so more vehicles available 1,096,118 +1/-7,564 3,2% +1/-4 HOUSE HEATING FUEL 0 1 1,399,111 (1) (1) Occupied housing units 3,199,111 +1/-7,564 12,4% +4/-6 Bottled, tank, or LP gas 618,31 +1/-1,784 19,% +4/-6 Bottled, tank, or LP gas 1,306 +1/-4,864 +4/-6 +4/-6 Gota cocke 1,306 +1/-4,864 +4/-6 +4/-6 Wood 1,406 1,4055 +1/-7,404 +4/-6	Moved in 1000 to 1000	1,001,095	T/-0,009	31.3%	+/-0.
above in 1980 and certifier 255,127 **/2,471 9.2% */4 Word in 1979 and certifier 255,865 */2 */2 */2 UPLICLES AVAILABLE 3,199,111 +/7,584 3,199,111 (*/2 Occupied housing units 3,199,111 */2,586 */2 */2 III AW */4 */4 */4 */4 */4 S or more vehicles available 1,155,192 */4 */4 */4 Occupied housing units 3,199,111 */7,584 */4 */4 Occupied housing units 3,199,111 */7,584 */4,581 */4 Bottled, tank, or LP gas 2,986,108 */4,581 */4,58 */4 Bottled, tank, or LP gas 12,994 */4 */4 */4 */4 Bottled, tank, or LP gas 111 */4,7584 12,4% */4 Bottled, tank, or LP gas 12,494 */4,4584 */4,4584 */4 Solar energy 2,337 */306 9,3% */4 Occupied housing	Moved in 1090 to 1099	511,827	+/-4,581	10.0%	+/-0.
autors 197 attract center 200.500 7-2,471 9.2% 944 VEHICLES AVAILABLE 0 4	Moved in 1970 and earlier	255,127	+/-2,866	8.0%	+/-0.
VEHICLES AVAILABLE 900 147,7504 3190,111 447,7504 3190,111		295,856	+/-2,471	9.2%	+/-0.
Occupied housing units 3199,111 +/-7.284 3199,111 +/-4 IN we whicles available 106,118 +/+6,467 34.3% +/+4 2 wehicles available 1.158,192 +/+6,617 36.2% +/+4 3 or more wehicles available 578,952 +/-3,315 11.1% +/-4 HOUSE HEATING FUEL	VEHICLES AVAILABLE				
No vehicles available 364,966 ++7.320 11.4% ++7.44 1 vehicles available 1.066,118 ++6.467 33.3% ++7.44 3 or more vehicles available 757,835 ++7.647 36.2% ++7.44 HOUSE HEATING FUEL	Occupied housing units	3,199,111	+/-7,594	3,199,111	()
1 vehicle available 106,118 ++6,47 34.3% ++4 2 vehicles available 1158,126 ++6,617 36.2% ++4 3 or more vehicles available 579,835 ++3,915 18.1% ++4 HOUSE HEATING FUEL 579,835 ++4,315 18.1% ++4 Docupied housing units 3,199,111 ++7,594 3,199,111 () Ubility gas 937,564 ++4,4564 12.4% ++4,4564 12.9% ++1,454 10.4%	No vehicles available	364,966	+/-3,209	11.4%	+/-0.
2 whicles available 1,158,112 ++-6,617 36.2% ++/-4 3 or more vehicles available 579,835 ++/-3,617 36.2% ++/-4 HOUSE HEATING FUEL 0 1 1 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,199,111 ++/-7,594 3,190,111 ++/-7,200 0,3% ++/-(-/-7,200,00%) ++/-(-/-7,20,00%) ++/-(-/-7,20,00%) ++/-(-/-7,20,00%) ++/-(-/-7,20,00%) ++/-(-/-7,20%) ++/-(-/-7,20%) +/-/-(-/-7,20%) ++/-(-/-7,20%) ++/-(-/-7,20%) ++/-(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) +/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) +/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/(-/-7,20%) ++/	1 vehicle available	1,096,118	+/-6,467	34.3%	+/-0.
3 or more vehicles available 579,835 ++3,915 18.1% ++4 HOUSE HEATING FUEL 3,199,111 () (2 vehicles available	1,158,192	+/-6,617	36.2%	+/-0.
HOUSE HEATING FUEL Image: Complet housing units 3,199,111 +/-7,594 3,199,111 (// Occupied housing units 2,396,108 +/-6,157 74,995 +/-4,178 Bottled, tank, or LP gas 2,316,108 +/-6,157 74,995 +/-4,178 Electricity 397,564 +/-4,564 12,475 +/-4,178 1,995 Coal or coke 1,306 1,47,504 3,199,111 +/-7,300 0,076 +/-4,454 Observed 1,4505 +/-7,220 0,576 +/-4,544 1,450 +/-7,200 0,176 +/-4,454 Other fuel 12,924 +/-6922 0,476 +/-4,454 +/-4,454 +/-4,454 SELECTED CHARACTERISTICS Imbinity facilities 9,151 +/-682 0,376 +/-4,455 Cocupied housing units 3,199,111 +/-7,544 3,199,111 (// 0,776 +/-4,25 Lacking complete plumbing facilities 9,151 +/-682 0,376 +/-4,25 Occupant housing units 3,199,1111 +/-7,759 3,199,1111	3 or more vehicles available	579,835	+/-3,915	18.1%	+/-0.
HOUSE PIEAL ING FUEL 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 (() Utility gas 2,396,108 +/-1,733 1,9% +/-/-7,84 1,9% <td></td> <td></td> <td></td> <td></td> <td></td>					
Dubling anits 3,193,111 +7,393 3,193,111 +7,393 3,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,393 5,193,111 +7,134 1,19% +4/4 Electricity 3,197,564 +1,4123 1,39% +1/4 5,193,111 +1/4 1,102 0,7% +1/4 1,101 1,101 1,101 1,101 1,	HOUSE HEATING FUEL	2 100 111	+/ 7 504	2 100 111	()
Unity gas 2.390,160 7-0,151 7+0,151 7+0,151 7+0,151 7+0,151 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 1,195 7+1,158 7+1,159 7+1,159 7+1,159	Litility geo	2 206 109	+/ 6 157	74 00/	+/ 0
Bolteb, lain, uit P gas 91,651 +7,173 1,93 +7,173 Electricity 397,664 +74,154 1,245 +74,145 Fuel oil, kersene, etc. 298,525 +73,045 9,3% +1/4 Coal or ocke 1,306 +/-722 0.5% +1/4 Wood 14,505 +/-722 0.5% +1/4 Other fuel 12,924 +1/662 0.4% +1/4 No fuel used 14,011 +1/-743 0.4% +1/4 Occupied housing units 3,199,111 +1/-754 3,199,111 (-1/10,12) 0.7% +1/4 Cocupied housing units 3,199,111 +1/-754 3,199,111 (-1/10,12) 0.7% +1/4 Occupied housing units 3,199,111 +1/-754 3,199,111 (-1/10,10) -1/10,12) 0.7% +1/4 Occupied housing units 3,199,111 +1/-7,746 9.69% +1/4 -1/10,12) 0.7% +1/4 Outer-accupied units 3,199,111 (-1/10,10) -1/10,10) -1/10,10)	Dutility gas	2,390,100	+/-0,137	14.9%	+/-0.
Electricity 397,984 +7/4,904 12.4% +7/4,904 Fuel cit, kerosene, etc. 298,525 +7/3,045 9.3% +1/4 Coal or coke 1,306 +1/300 0.0% +1/4 Wood 14,505 +1/-722 0.5% +1/4 Solar energy 2,337 +1/307 0.1% +1/4 Other fuel 12,924 +1/692 0.4% +1/4 SELECTED CHARACTERISTICS 14,011 +1/-754 3,199,111 (////////////////////////////////////	Bollied, lank, of LP gas	01,031	+/-1,730	1.9%	+/-0.
Tuel off, Nortcenter, BLC. 239,323 47-3,040 9,3% 47-4,404 Coal or coke 1,306 47-300 0,0% 47-4,404 Wood 14,505 47-722 0,5% 47-4,407 Solar energy 2,337 +47-307 0,1% +4/4 Other fuel 12,924 +1/-692 0.4% +1/4 No fuel used 14,011 +1/-723 0,4% +1/4 SELECTED CHARACTERISTICS 5 3,199,111 +1/-7,594 3,199,111 (1) Lacking complete kitchen facilities 23,530 +1/-1,012 0,7% +1/-4 Occupied housing units 3,199,111 +1/-7,594 3,199,111 (1) Occupied housing units 3,199,111 +1/-7,594 3,199,111 (1) 1.00 or less 3,099,268 +1/-7,746 96.9% +1/-4/4 0.10 to 1.50 66,898 +1/-7,746 96.9% +1/-4/4 1.00 or less 3,099,268 +1/-1,719 3,1% +1/-4 VALUE	Electricity	397,304	+/ 2 045	12.470	+/-0.
Usin to take 1,300 17,300 0.0% 14,505 Wood 14,505 14,722 0.5% 14,125 Solar energy 2,337 14,730 0.1% 14,125 Other fuel 12,924 14,011 14,743 0.4% 14,011 No fuel used 14,011 14,743 0.4% 14,011 SELECTED CHARACTERISTICS 0.3% 14,62 0.3% 14,62 Occupied housing units 3,199,111 4,7594 3,199,111 (Lacking complete kitchen facilities 23,530 14,1,012 0.7% 14,02 No telephone service available 56,439 14,1625 1.8% 14,02 OCCUPANTS PER ROOM 0.00 ress 3,199,111 14,774 96,9% 14,04 1.51 or more 3,2855 14,1,271 1.9% 14,047 2,052,073 (VALUE 0 63,801 14,1,547 1.9% 14,047 2,052,073 (Stop,000 to \$299,999 63,501 14,1,473	Cool or coko	1 206	+/ 200	9.576	+/-0.
Wood 14,303 14,722 0.3% 47,427 Solar energy 2,337 47,437 0.1% 47,437 Other fuel 12,924 47,632 0.4% 47,477 No fuel used 14,011 47,473 0.4% 47,477 SELECTED CHARACTERSTICS	Wood	14.505	+/-300	0.076	+/-0.
Data tenergy 2,33 1/-53 0.113 1/-12 Other fuel 12,924 1/-692 0.4% +1/-1 No fuel used 14,011 +1/-743 0.4% +1/-1 SELECTED CHARACTERISTICS 0 1.11 +1/-743 0.4% +1/-1 Lacking complete plumbing facilities 3,199,111 +/-7,594 3,199,111 (////////////////////////////////////	Solar operav	2 337	+/ 307	0.3%	+/-0.
Other lased 12,324 17,032 0,7,5 0,7,5 No fuel used 14,011 +1,743 0,4% +1,7 SELECTED CHARACTERISTICS 3,199,111 +1,7,594 3,199,111 +1,7,594 3,199,111 +1,7,594 3,199,111 +1,682 0,3% +1,6 Lacking complete plumbing facilities 9,151 +1,682 0,3% +1,6 +1,1	Other fuel	12 024	+/ 602	0.1%	+/-0.
SELECTED CHARACTERISTICS Image: Constraint of the sector of	No fuel used	14,011	+/-743	0.4%	+/-0.
SELECTED CHARACTERISTICS 4 4 Occupied housing units 3,199,111 +/-7,594 3,199,111 +/-7,594 3,199,111 () Lacking complete plumbing facilities 9,151 +/-682 0.3% +/-/-02 No telephone service available 23,530 +/-1,012 0.7% +/-02 OCCUPANTS PER ROOM 3,199,111 +/-7,594 3,199,111 () Occupied housing units 3,199,111 +/-7,746 9.6% +/-02 1.01 to 1.50 66,988 +/-1,737 2.1% +/-02 1.51 or more 32,855 +/-1,421 1.0% +/-02 VALUE 0 62,919 +/-1,422 3.0% +/-02 Value 0 63,801 +/-1,519 3.1% +/-02 Sto0.000 to \$99,999 120,820 +/-2,386 5.9% +/-02 \$150,000 to \$99,999 209,336 +/-3,017 10.2% +/-02 \$100,000 to \$149,999 209,366 +/-4,406 23.4% +/-02 \$100,000 to					
Occupied housing units 3,199,111 +/-7,594 3,199,111 () Lacking complete kitchen facilities 9,151 +/-682 0.3% +/-() No telephone service available 56,439 +/-1,012 0.7% +/-() OCCUPANTS PER ROOM 56,439 +/-1,7594 3,199,111 () () Occupied housing units 3,199,111 +/-7,594 3,199,111 () () 1.00 or less 3,099,268 +/-7,746 96.9% +/-() <	SELECTED CHARACTERISTICS				
Lacking complete plumbing facilities 9,151 +/-682 0.3% +/-(1,012 0.7% +/-(2,012) No telephone service available 56,439 +/-1,625 1.8% +/-(2,022) OCCUPANTS PER ROOM	Occupied housing units	3,199,111	+/-7,594	3,199,111	()
Lacking complete kitchen facilities 23,530 +/-1,012 0.7% +/-6 No telephone service available 56,439 +/-1,625 1.8% +/-6 OCCUPANTS PER ROOM 3,199,111 +/-7,746 96.9% +/-6 Oto reless 3,099,268 +/-7,746 96.9% +/-6 1.01 to 1.50 66.988 +/-1,737 2.1% +/-6 VALUE 32,855 +/-1,81 1.0% +/-6 Owner-occupied units 2,052,073 +/-10,470 2,052,073 (////////////////////////////////////	Lacking complete plumbing facilities	9,151	+/-682	0.3%	+/-0.
No telephone service available 56,439 +/-1,625 1.8% +/-6 OCCUPANTS PER ROOM 3,199,111 +/-7,746 3,199,111 (////////////////////////////////////	Lacking complete kitchen facilities	23,530	+/-1,012	0.7%	+/-0
OCCUPANTS PER ROOM Image: Comparison of the	No telephone service available	56,439	+/-1,625	1.8%	+/-0
Occupied housing units 3,199,111 +/-7,594 3,199,111 (() 1.00 or less 3,099,268 +/-7,746 96.9% +/-() 1.01 to 1.50 66,988 +/-1,737 2.1% +/-() 1.51 or more 32,855 +/-1,281 1.0% +/-() VALUE	OCCUPANTS PER ROOM				
1.00 or less 3,099,28 +/-7,746 96,9% +/-(-1,746) 1.01 to 1.50 66,988 +/-7,737 2.1% +/-(-1,737) 1.51 or more 32,855 +/-1,281 1.0% +/-(-1,737) VALUE 2,052,073 +/-1,482 3.0% +/-(-1,746) Owner-occupied units 2,052,073 +/-1,482 3.0% +/-(-1,746) VALUE 63,801 +/-1,482 3.0% +/-(-1,746) Stoo,000 to \$99,999 63,801 +/-1,482 3.0% +/-(-1,746) \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-(-0,74) \$200,000 to \$199,999 209,336 +/-3,017 10.2% +/-(-0,74) \$200,000 to \$299,999 675,916 +/-5,074 32.9% +/-(-0,74) \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-(-0,74) \$50,000 to \$499,999 675,916 +/-5,074 32.9% +/-(-0,74) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(-0,74) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(-0,75,750) <tr< td=""><td>Occupied housing units</td><td>3 199 111</td><td>+/-7 594</td><td>3 199 111</td><td>0</td></tr<>	Occupied housing units	3 199 111	+/-7 594	3 199 111	0
1.00 to 10.50 1.1,173 2.050,200 1.1,173 2.050,173 1.1,173 1.51 or more 32,855 +/-1,281 1.0% +/-C VALUE 2,052,073 +/-1,482 3.0% +/-C Owner-occupied units 2,052,073 +/-1,482 3.0% +/-C \$50,000 to \$99,999 63,801 +/-1,519 3.1% +/-C \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-C \$150,000 to \$199,999 209,336 +/-3,017 10.2% +/-C \$200,000 to \$299,999 480,964 +/-4,366 23.4% +/-C \$200,000 to \$499,999 675,916 +/-5,074 32.9% +/-C \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-C \$500,000 to \$999,999 370,890 +/-871 (X) (X) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-C \$1,000,000 or more 68,147 +/-2,250 67.9% +/-C MortGAGE STATUS 321,100 +/-871 (X) (X) Owner-occupied units 2,0	1 00 or less	3 099 268	+/-7 746	96.9%	+/-0
1.510 more 30,000 17,1,101 2.170 17,100 VALUE 32,855 +/-1,281 1.06 1.06 Owner-occupied units 2,052,073 +/-1,482 3.0% +/-0 Less than \$50,000 62,199 +/-1,482 3.0% +/-0 \$50,000 to \$99,999 63,801 +/-1,519 3.1% +/-0 \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-0 \$150,000 to \$199,999 209,336 +/-3,017 10.2% +/-0 \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-0 \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-0 \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-0 \$1,000,000 or more 68,147 +/-1,224 3.3% +/-0 \$1,000,000 or more 68,147 +/-1,250 18.1% +/-0 Median (dollars) 321,100 +/-871 (X) (X) MortrackE STATUS	1.00 of 1000	66 988	+/-1 737	2.1%	+/-0
VALUE VALUE VALUE Owner-occupied units 2,052,073 +/-10,470 2,052,073 (/ Less than \$50,000 £99,999 £3,801 +/-1,482 3.0% +/-C \$100,000 to \$149,999 £03,801 +/-1,519 3.1% +/-C \$100,000 to \$199,999 £03,801 +/-2,396 5.9% +/-C \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-C \$200,000 to \$299,999 £075,916 +/-5,074 32.9% +/-C \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-C \$1,000,000 or more £8,147 +/-1,224 3.3% +/-C \$2052,073 +/-10,470 2,052,073 (/	1.51 or more	32,855	+/-1.281	1.0%	+/-0
VALUE value value value Owner-occupied units 2,052,073 +/-10,470 2,052,073 (() Less than \$50,000 62,199 +/-1,482 3.0% +/-() \$50,000 to \$99,999 63,801 +/-1,182 3.1% +/-() \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-() \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-() \$200,000 to \$499,999 675,916 +/-5,074 32.9% +/-() \$300,000 to \$499,999 370,890 +/-6,074 32.9% +/-() \$1,000,000 or more 68,147 +/-1,224 3.3% +/-() \$1,000,000 or more 68,147 +/-1,224 3.3% +/-() \$1,000,000 or more 68,147 +/-1,224 3.3% +/-() \$0wner-occupied units 2,052,073 +/-10,470 2,052,073 () MORTGAGE STATUS 0 - - - - Owner-occupied units 2,052,073 +/-10,470		,	,		
Owner-occupied units 2,052,073 +/-10,470 2,052,073 () Less than \$50,000 62,199 +/-1,482 3.0% +/-() \$\$50,000 to \$99,999 63,801 +/-1,519 3.1% +/-() \$\$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-() \$\$150,000 to \$299,999 480,964 +/-4,306 23.4% +/-() \$\$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-() \$\$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-() \$\$10,000 to sayes,999 370,890 +/-6,074 32.9% +/-() \$\$10,000 to sayes,999 370,890 +/-6,074 32.9% +/-() \$\$1,000,000 or more 68,147 +/-1,224 3.3% +/-() \$\$1,000,000 or more 68,147 +/-1,24 3.3% +/-() Median (dollars) 321,100 +/-871 (X) () Owner-occupied units 2,052,073 +/-10,470 2,052,073 () Housing units with a mortgage 1,394,121 +/-7,250 67,9% +/-0 SE	VALUE				
Less than \$50,000 62,199 +/-1,482 3.0% +/-(.482) \$50,000 to \$99,999 63,801 +/-1,519 3.1% +/-(.482) \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-(.482) \$150,000 to \$199,999 209,336 +/-4,306 23.4% +/-(.482) \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-(.482) \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-(.482) \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-(.482) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(.482) Median (dollars) 321,100 +/-871 (X) (X) MortGAGE STATUS 2,052,073 +/-10,470 2,052,073 (////////////////////////////////////	Owner-occupied units	2,052,073	+/-10,470	2,052,073	()
\$50,000 to \$99,999 63,801 +/-1,519 3.1% +/-C \$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-C \$150,000 to \$199,999 209,336 +/-3,017 10.2% +/-C \$200,000 to \$299,999 480,964 +/-5,074 32.9% +/-C \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-C \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-C \$1,000,000 or more 68,147 +/-1,224 3.3% +/-C Median (dollars) 321,100 +/-871 (X) (X) Owner-occupied units 2,052,073 +/-10,470 2,052,073 (C) Housing units with a mortgage 1,394,121 +/-7,250 67.9% +/-C SELECTED MONTHLY OWNER COSTS (SMOC)	Less than \$50,000	62,199	+/-1,482	3.0%	+/-0.
\$100,000 to \$149,999 120,820 +/-2,396 5.9% +/-(.0) \$150,000 to \$199,999 209,336 +/-3,017 10.2% +/-(.0) \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-(.0) \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-(.0) \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-(.0) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(.0) Median (dollars) 321,100 +/-871 (X) ((.1)) MORTGAGE STATUS	\$50,000 to \$99,999	63,801	+/-1,519	3.1%	+/-0
\$150,000 to \$199,999 209,336 +/-3,017 10.2% +/-(2) \$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-(2) \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-(2) \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-(2) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(2) MORTGAGE STATUS 321,100 +/-10,470 2,052,073 (/) Mousing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 Housing units with a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC) 10.3% 4,410 +/-349 0.3% +/-0 Housing units with a mortgage 1,394,121 +/-7,250 1,394,121 (/) -/) SELECTED MONTHLY OWNER COSTS (SMOC) 4,410 +/-349 0.3% +/-0 Housing units with a mortgage 1,394,121 +/-7,250 1,394,121 (/) Less than \$500 4,410 +/-349 0.3% +/-0 \$5000 to \$5000 10.000 10	\$100,000 to \$149,999	120,820	+/-2,396	5.9%	+/-0
\$200,000 to \$299,999 480,964 +/-4,306 23.4% +/-(-0) \$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-(-0) \$500,000 to \$999,999 370,890 +/-1,224 3.3% +/-(-0) \$1,000,000 or more 68,147 +/-1,224 3.3% +/-(-0) Median (dollars) 321,100 +/-871 (X) (X) MORTGAGE STATUS 321,100 +/-871 (X) (X) More-occupied units 2,052,073 +/-10,470 2,052,073 (-0) Housing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	\$150,000 to \$199,999	209,336	+/-3,017	10.2%	+/-0
\$300,000 to \$499,999 675,916 +/-5,074 32.9% +/-0 \$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-0 \$1,000,000 or more 68,147 +/-1,224 3.3% +/-0 Median (dollars) 321,100 +/-871 (X) (X) MORTGAGE STATUS 2,052,073 +/-10,470 2,052,073 ((X) Mousing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	\$200,000 to \$299,999	480,964	+/-4,306	23.4%	+/-0
\$500,000 to \$999,999 370,890 +/-3,560 18.1% +/-40 \$1,000,000 or more 68,147 +/-1,224 3.3% +/-40 Median (dollars) 321,100 +/-871 (X) (X) MORTGAGE STATUS 2,052,073 +/-10,470 2,052,073 (() Mousing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 Housing units with a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	\$300,000 to \$499,999	675,916	+/-5,074	32.9%	+/-0
\$1,000,000 or more 68,147 +/-1,224 3.3% +/-0 Median (dollars) 321,100 +/-871 (X) (MORTGAGE STATUS 2,052,073 +/-10,470 2,052,073 (Mousing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 Housing units with a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	\$500,000 to \$999,999	370,890	+/-3,560	18.1%	+/-0
Median (uoliars) 321,100 +/-8/1 (X) ((MORTGAGE STATUS 2,052,073 +/-10,470 2,052,073 (() Mousing units with a mortgage 1,394,121 +/-7,250 67,9% +/-0 Housing units with a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	\$1,000,000 or more	68,147	+/-1,224	3.3%	+/-0
MORTGAGE STATUS 2,052,073 +/-10,470 2,052,073 () Owner-occupied units 2,052,073 +/-10,470 2,052,073 () Housing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 Housing units without a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	median (dollars)	321,100	+/-871	(X)	()
Owner-occupied units 2,052,073 +/-10,470 2,052,073 () Housing units with a mortgage 1,394,121 +/-7,250 67.9% +/-0 Housing units without a mortgage 657,952 +/-5,449 32.1% +/-0 SELECTED MONTHLY OWNER COSTS (SMOC)	MORTGAGE STATUS				
Housing units with a mortgage 1,394,121 +/-7,250 67.9% +/-C Housing units without a mortgage 657,952 +/-5,449 32.1% +/-C SELECTED MONTHLY OWNER COSTS (SMOC) 1,394,121 +/-7,250 1,394,121 (////////////////////////////////////	Owner-occupied units	2.052.073	+/-10.470	2,052.073	C
Housing units without a mortgage Housing units with a mortgage </td <td>Housing units with a mortgage</td> <td>1.394.121</td> <td>+/-7.250</td> <td>67.9%</td> <td>+/-0</td>	Housing units with a mortgage	1.394.121	+/-7.250	67.9%	+/-0
SELECTED MONTHLY OWNER COSTS (SMOC) 1,394,121 +/-7,250 1,394,121 (() Housing units with a mortgage 1,394,121 +/-7,250 1,394,121 () Less than \$500 4,410 +/-394 0.3% +/-()	Housing units without a mortgage	657,952	+/-5,449	32.1%	+/-0
SELECTED MONTHLY OWNER COSTS (SMOC) 1,394,121 +/-7,250 1,394,121 () Housing units with a mortgage 1,394,121 +/-7,250 1,394,121 () Less than \$500 4,410 +/-394 0.3% +/-()					
Trousing units with a mortgage 1,394,121 +/-/.201 1,394,121 () Less than \$500 4,410 +/-394 0.3% +/-/.201	SELECTED MONTHLY OWNER COSTS (SMOC)	4 004 404	,17.050	1 204 404	
Cos train word Cos tra	nousing units with a mortgage	1,394,121	+/-7,250	1,394,121	
	1000 to \$000	4,410	+/ 4 040	0.3%	+/-0

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\$1,000 to \$1,499	158,998	+/-2,501	11.4%	+/-0.2
\$1,500 to \$1,999	265,558	+/-3,376	19.0%	+/-0.2
\$2,000 to \$2,499	279,158	+/-3,141	20.0%	+/-0.2
\$2,500 to \$2,999	230,345	+/-3,473	16.5%	+/-0.2
\$3,000 or more	409,562	+/-3,944	29.4%	+/-0.3
Median (dollars)	2,398	+/-6	(X)	(X)
Housing units without a mortgage	657,952	+/-5,449	657,952	(X)
Less than \$250	13,783	+/-786	2.1%	+/-0.1
\$250 to \$399	20,441	+/-853	3.1%	+/-0.1
\$400 to \$599	53,975	+/-1,378	8.2%	+/-0.2
\$600 to \$799	102,703	+/-2,042	15.6%	+/-0.3
\$800 to \$999	135,619	+/-2,093	20.6%	+/-0.3
\$1,000 or more	331,431	+/-3,653	50.4%	+/-0.3
Median (dollars)	1,005	+/-4	(X)	(X)
SELECTED MONTHLY OWNER COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME (SMOCAPI)				
Housing units with a mortgage (excluding units where SMOCAPI cannot be computed)	1,388,139	+/-7,228	1,388,139	(X)
Less than 20.0 percent	459,180	+/-4,808	33.1%	+/-0.3
20.0 to 24.9 percent	228,447	+/-3,417	16.5%	+/-0.2
25.0 to 29.9 percent	172,421	+/-2,730	12.4%	+/-0.2
30.0 to 34.9 percent	121,972	+/-2,434	8.8%	+/-0.2
35.0 percent or more	406,119	+/-3,920	29.3%	+/-0.3
Not computed	5,982	+/-585	(X)	(X)
Housing unit without a mortgage (excluding units where SMOCAPI cannot be computed)	651,706	+/-5,427	651,706	(X)
Less than 10.0 percent	160,156	+/-2,863	24.6%	+/-0.3
10.0 to 14.9 percent	128,064	+/-2,288	19.7%	+/-0.3
15.0 to 19.9 percent	86,909	+/-1,641	13.3%	+/-0.2
20.0 to 24.9 percent	61,615	+/-1,440	9.5%	+/-0.2
25.0 to 29.9 percent	43,581	+/-1,263	6.7%	+/-0.2
30.0 to 34.9 percent	31,691	+/-1,105	4.9%	+/-0.2
35.0 percent or more	139,690	+/-2,172	21.4%	+/-0.3
Not computed	6,246	+/-507	(X)	(X)
GROSS RENT				
Occupied units paving rent	1,108,584	+/-5.902	1.108.584	(X)
Less than \$500	89,566	+/-1.948	8.1%	+/-0.2
\$500 to \$999	224.027	+/-2.821	20.2%	+/-0.2
\$1.000 to \$1.499	447.592	+/-4.147	40.4%	+/-0.3
\$1,500 to \$1,999	212.848	+/-3.407	19.2%	+/-0.3
\$2,000 to \$2,499	78.850	+/-1.976	7.1%	+/-0.2
\$2,500 to \$2,999	30,364	+/-1.186	2.7%	+/-0.1
\$3,000 or more	25.337	+/-1.031	2.3%	+/-0.1
Median (dollars)	1,249	+/-4	(X)	(X)
No rent paid	38,454	+/-1.411	(X)	(X)
		,	(**)	(**)
GROSS RENT AS A PERCENTAGE OF HOUSEHOLD INCOME (GRAPI)				
Occupied units paying rent (excluding units where GRAPI cannot be computed)	1,084,961	+/-5,773	1,084,961	(X)
Less than 15.0 percent	126,5/3	+/-2,792	11.7%	+/-0.2
15.0 to 19.9 percent	129,423	+/-2,470	11.9%	+/-0.2
20.0 to 24.9 percent	133,489	+/-2,673	12.3%	+/-0.2
25.0 to 29.9 percent	122,603	+/-2,471	11.3%	+/-0.2
30.0 to 34.9 percent	99,641	+/-2,255	9.2%	+/-0.2
35.0 percent or more	473,232	+/-4,617	43.6%	+/-0.4
Not computed	62,077	+/-1,848	(X)	(X)

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates

Explanation of Symbols:

An '**' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be

calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.

An '- following a median estimate means the median falls in the lowest interval of an open-ended distribution. An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.

An * following a mediat estimate means the median fails in the upper interval of an open-ended distribution. An ***** entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate. An ***** entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small. An '(X)' means that the estimate is not applicable or not available.

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				(2009-	·2018)						
											Total
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2009-2018
NJWC Total Billed Annual Revenue*	410,469,866	432,198,459	439,676,035	461,162,881	450,704,130	457,426,392	485,970,924	522,731,814	502,384,314	514,115,359	4,676,840,174
Total Authorized Revenue**	439,739,115	439,739,115	454,158,610	467,686,598	473,360,865	473,360,865	479,895,096	501,344,725	501,344,725	516,018,955	4,746,648,670
Revenue Recovery to Authorized (Under)/Over	(29,269,249)	(7,540,656)	(14,482,575)	(6,523,717)	(22,656,735)	(15,934,473)	\$6,075,828	\$21,387,089	\$1,039,589	(\$1,903,596)	(\$69,808,496)
	-6.66%	-1.71%	-3.19%	-1.39%	-4.79%	-3.37%	1.27%	4.27%	0.21%	-0.37%	-1.47%
NJWC Total Annual Water Sales (000 Gallons)	62,198,523	68,349,122	63,430,775	63,855,472	60,752,397	61,405,819	64,430,499	63,682,367	61,401,684	60,648,710	630,155,367
Fotal Authorized Water Sales*	68,557,095	68,557,095	65,194,420	64,517,922	64,234,167	64,234,167	63,324,154	60,336,896	60,336,896	60,340,356	639,633,168
Water Sales to Authorized (Under)/Over	(6,358,572)	(207,973)	(1,763,645)	(662,450)	(3,481,770)	(2,828,348)	1,106,345	3,345,471	1,064,788	308,354	(9,477,801)
	-9.27%	-0.30%	-2.71%	-1.03%	-5.42%	-4.40%	1.75%	5.54%	1.76%	0.51%	-1.48%
											Average
											2009-2018
Annual Cooling Degree Days	791	1,285	1,218	1,142	1,029	869	1,051	1,233	1,014	1,249	1,088
Percipitation June-Sept	17.7	8.9	24.4	11.7	9.5	9.0	6.6	10.9	11.1	17.5	12.7

New Jersey American Water Company Actual Revenue/Water Sales Compared to Utilized (2009-2018)

*GMS only. Exclusive of DSIC and Surcharge and Other Water Revenue

**GMS only. Per Commission Orders Exclusive of Other Water Revenue

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