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Natural Gas Service Expansion Criteria in Maine

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Capstone Paper for the Master in Public Policy and Management
program

Muskie School of Public Service

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Natural Gas Service Expansion Criteria in Maine

Purpose Statement

The purpose of this study is to gain an understanding of the framework used by Maine's natural gas utilities in making decisions to expand natural gas infrastructure and service to new customers, and then to apply this knowledge in an attempt to identify municipalities that are potentially attractive candidates for service expansion within Maine. This study is not a precise model for gas utilities, but is meant rather to be a reconnaissance study for finding viable and attractive candidates for service. This study was limited both by resources and the inaccessibility of proprietary information.

Research Questions

1. What criteria do Maine's natural gas utilities use in deciding where to expand gas infrastructure and service areas to new customers?
2. Using these criteria, which municipalities within Maine make attractive candidates for the expansion of natural gas service?

Background

Characteristics of Natural Gas

Following an upturn and subsequent decline in recent decades in the popularity of natural gas (due to concerns over proven reserves), significant advances in natural gas drilling technologies have

Figure 5. U.S. wet natural gas proved reserves, 1980-2010

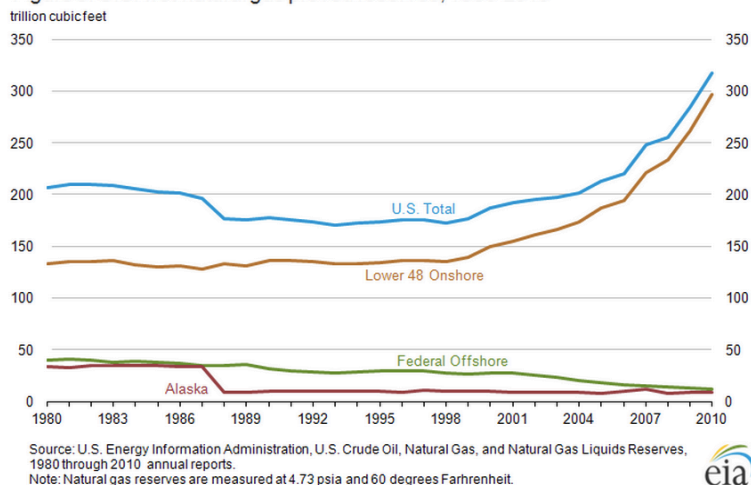


Figure 1 U.S. wet natural gas proved reserves 1980-2010
<http://www.eia.gov/naturalgas/crudeoilreserves/>

drastically increased proven reserves. This increase in supply and the accompanying reduction in gas prices have led to changes in America's and Maine's, energy strategies by shifting more energy consumption toward natural gas. Specifically, over the last decade, advancements in hydraulic fracturing (a method of gas extraction that has allowed for drilling in new places, albeit with some controversy) have led to a significant increase of gas reserves in the United States and elsewhere (EIA 12 2012). This recent advance in drilling technology, also known as "fracking," has led to the rapid development of the natural gas market and an increase in production and supply, driving gas prices to their lowest levels in ten years (Economist 2012). These prices have made natural gas very competitive as a source of energy (Economist 2012). Such factors have led to bold statements and predictions about the future of natural gas in the United States. The International Energy Agency recently proclaimed that "the golden age of gas has dawned on North America," (IEA 2012) while MIT's energy initiative has announced natural gas as a "bridge" to a renewable energy future (MIT 2011), and President Obama has touted a century's worth of natural gas (Obama 2012).

In addition to the recent increase in proven reserves and a resulting more competitive price, natural gas has become important to America's energy strategies due to

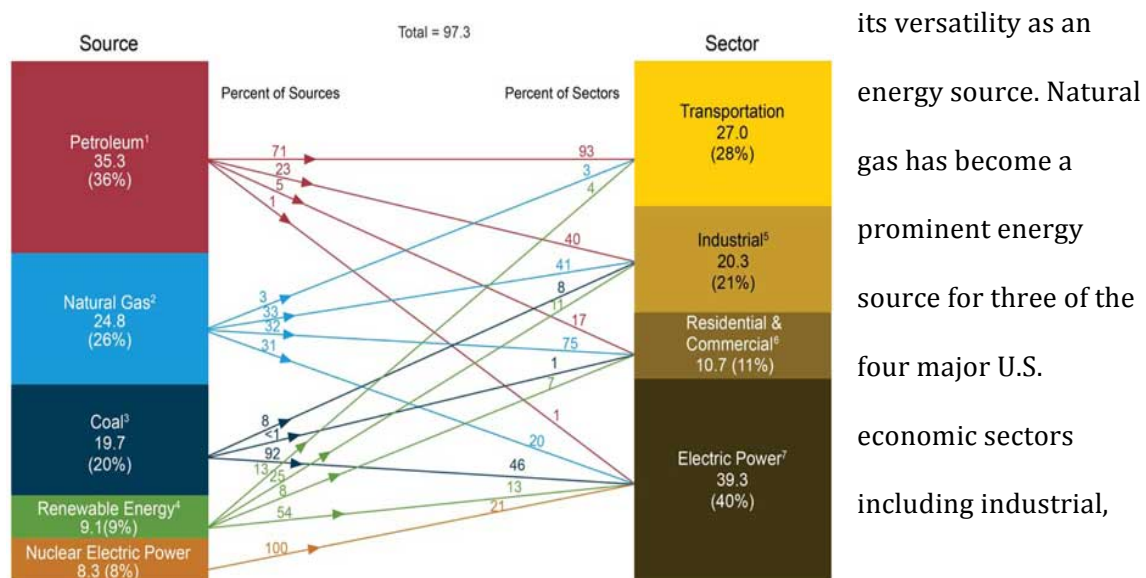


Figure 2 "Annual Energy Review 2011." DOE/EIA-0384(2011). Prod. DOE/EIA. Washington, D.C., 09 2012.

residential and commercial, and electric power (EIA 4 2012). Of U.S. natural gas consumption, 96% is consumed by these three sectors (EIA 4 2012). The industrial sector consumes 33% of the natural gas used in the U.S., while the residential and commercial sectors claim 32%, and the electric power production sector uses 31% (EIA 4 2012). Though coal and oil contribute significantly to energy production in the U.S., coal is primarily used for electric power production, while oil is primarily used in the transportation and industrial sectors.

Maine's Energy Picture: A Snapshot

Maine's natural resources, geographic features, and industries have heavily shaped the State's current energy picture. Because it has no native fossil fuel reserves, Maine relies 100% on imports to meet fossil fuel demands. The numerous waterways, immense forests, and wind-abundant areas in Maine provide significant renewable resources such as hydroelectric, wood-fired, and wind-powered energy generation (EIA 2 2009).

Per capita, Maine ranked 28th among all U.S. states in total energy used in 2010 with a total of 307 million Btu per capita and approximately 407 trillion Btu state wide (EIA 1 2012). The state's industrial consumers consumed 140,207 trillion Btu in 2010, more than any other sector over the same period (EIA 11 2012). Led by an energy-intensive forest products industry, Maine is the only New England state in which industry is the top energy-consuming sector (EIA 2 2009). The transportation sector ranks second, using 125,881 billion Btu, while the residential and commercial sectors rank 3rd and 4th, consuming 79,216 and 61,993 billion Btu, respectively (EIA 1 2012).

Maine, like most states, relies on a varied fuel mix to meet the demand from its various industries. The state relies heavily on petroleum, using it to meet 45% of its energy needs. This consumption rate is slightly more than consumption of the next two fuels combined (EIA 11 2012). It is notable that almost 70% of Maine households rely on oil as

their primary heating source (EIA 1 2012). Biomass fuel consumption follows at 25% (EIA 11 2012) and is indicative of the forest products industry using their waste as an energy source. Natural gas is next at 19% and is on the rise as service expands in the state (EIA 11 2012). The remaining 10% of fuels consumed are hydroelectric power at 9%; the final 1% is a combination other renewable energy sources (such as wind and solar) and finally a very small amount of coal (EIA 11 2012).

As on the national scale, natural gas in Maine is consumed by three of the four major fuel sectors including electrical power, industrial, and residential and commercial. Industrial use totaled 37% of Maine's overall natural gas consumption (EIA 1 2012). Maine's electricity production consumes 52% of all natural gas used in the state. Finally, the residential and commercial sector consumed only 9% (EIA 1 2012). Despite the versatility and potential cost savings offered by natural gas, Maine's low adoption within the residential and commercial sector directly reflects the challenges of natural gas distribution within the state.

Converting from oil to natural gas in Maine would mean large economic savings for the state as a whole. According to Maine's Energy Office Director, converting from oil to natural gas as one's primary heating fuel can save consumers between 30 and 50% in heating costs on average (Washuk 2012). Auburn schools expect to save several hundred thousand dollars annually in heating costs by switching from oil to natural gas (Washuk 2012). Likewise, Woodland Pulp, LLC in Baileyville expects a one-year payback on their \$12 million investment to convert from oil to natural gas (Mack 2011).

Delivering Natural Gas: The Challenge

A major obstacle to natural gas distribution is that, relative to other fuels, it is difficult and expensive to distribute. The physical properties of natural gas require it to be either shipped via pipeline or by being liquefied, transported, and then re-gasified. In

contrast to other carbon fuels, natural gas requires very little processing after extraction (MIT 2011). Initial refinement contributes significantly to fuel costs for oil and coal, for example (MIT 2011). However, the transportation and distribution costs of natural gas can represent up to a 500% price increase over post-refinement value per MMBtu for end users (MIT 2011).

Three major pipelines transport natural gas through Maine. While southern Maine historically receives natural gas via New Hampshire (EIA 8 2012), two relatively new pipelines from Canada have drastically increased the supply of natural gas in Maine and, indeed, the rest of the Northeast (EIA 2 2009). The Maritimes & Northeast Pipeline (Maritimes), which began operation in 1999, enters the U.S. in Calais, Maine, and has a total length of 684 miles (Maritimes 2012) carrying 0.7 Bcf per day from the source in the Sable Island region off Nova Scotia's eastern coast (EIA 8 2012). The Portland Natural Gas Transmission System (PNGTS) was completed in the year 2000 and enters the U.S. in Pittsburg, New Hampshire and stretches 144 miles to Westbrook, Maine (PNGTS 2012). (Flow rate information for PNGTS was not found.) Finally, the M&N/PNGTS pipelines join together in Westbrook, Maine, and run approximately 100 miles to a major hub in Dracut, Massachusetts delivering 0.1 Bcf of gas daily to Massachusetts (PNGTS 2012).

Together these pipelines transported 203,559 Mmcft of natural gas in 2010, a 9% increase over the previous year (EIA 9 2012). Of this, 77,574 Mmcft were consumed in Maine, an approximate 10% increase over the previous year (EIA 7 2012). Of the remainder, the vast majority is exported to other parts of the Northeast through New Hampshire and Massachusetts, while a very small proportion is diverted back into Canada (EIA 9 2012). Approximately 90% of the natural gas entering Maine is imported from Canada, with the remainder coming from U.S. supplies via New Hampshire (EIA 9 2012).

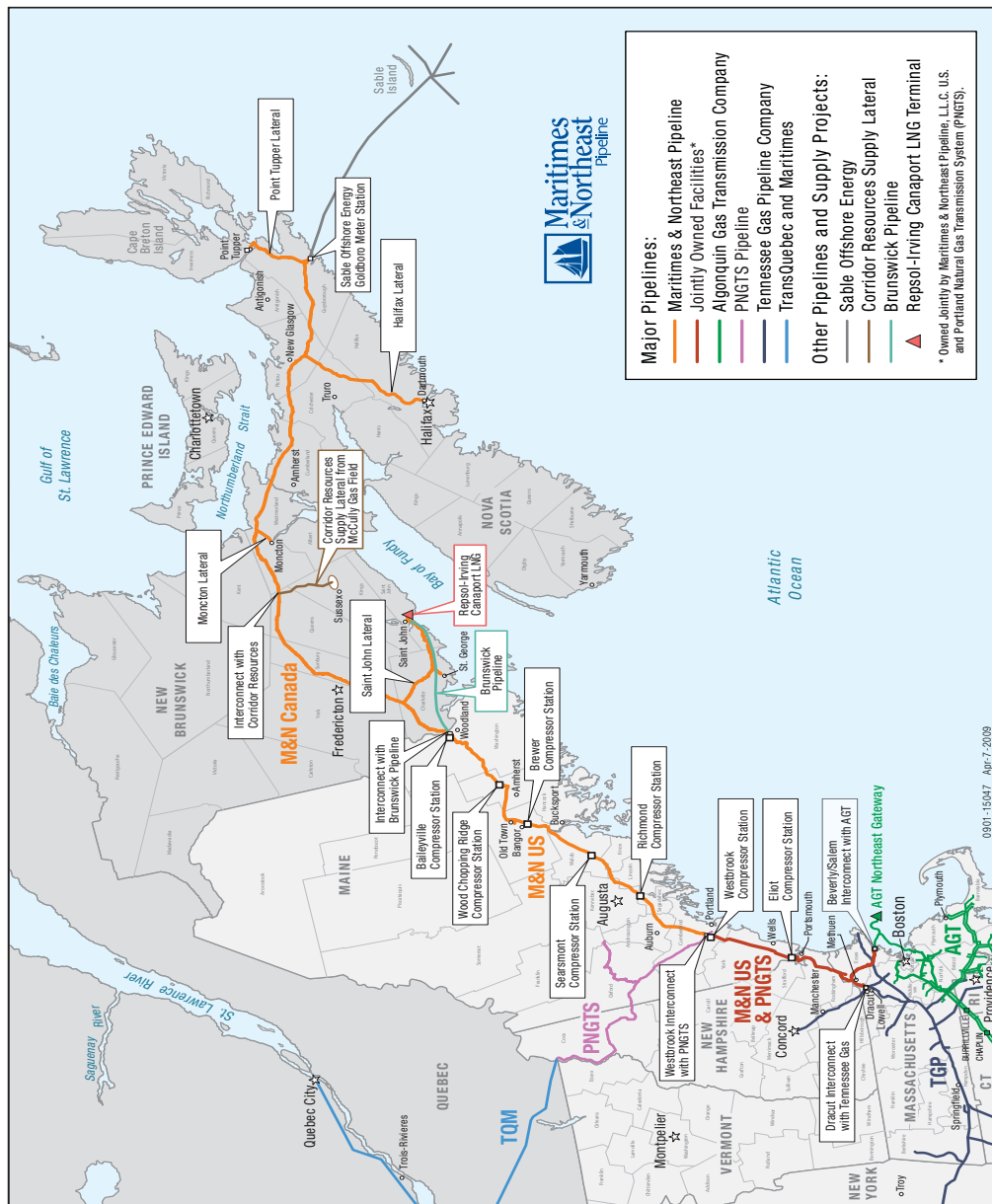


Figure 3 Maritimes and Northeast Pipeline – Map. <http://www.mnpp.com/us/map>

Gas Utilities in Maine

The Maine Public Utilities Commission (MPUC) lists four natural gas distributors authorized to operate in the State. Maine Natural Gas, LLC (MNG) serves residents in towns such as Brunswick, Topsham, Bowdoin, Gorham, and Windham (MPUC 1 2014). Bangor Gas

Company LLC (BGC) provides natural gas service to customers in the Bangor area (MPUC 1 2014). Unitil, the largest of the three and covers much of southern Maine and the Lewiston area (MPUC 1 2014). Summit Natural Gas, based out of Colorado, received authorization from the MPUC in 2013 to serve customers throughout the Kennebec Valley region (MPUC 1 2014). Both MNG and BGC are in expansion mode with Unitil updating infrastructure (Hepfner, Interview I 2012). The prices and “quality of service” provided to residential customers by these utilities are regulated by the MPUC (MPUC 2 2012), while the pipelines are regulated by the Federal Energy Regulatory Commission (MPUC 3 2012). Service expansion decisions are made independently by each utility and are not limited to geographic boundaries within Maine.

Discussion of paper approach – literature review, data, and methodology

Literature Review

A comprehensive attempt was made to locate relevant research on the methodologies used by the gas utility companies for service expansion decisions. Publicly available information is very scarce, especially regarding the application and detail of utility decision models. Representatives of two of the four utilities were interviewed about their decision process. These include Mr. John Hepfner, a financial analyst with MNG, and Mr. John Kunz, a marketing director at BGC. Several attempts to contact Unitil remain unanswered. In addition, the publicly available “terms and conditions of service” found on each utility’s website and that of the MPUC provided insight into each utility’s operations. Additionally, various government resources including the U.S. Energy Information Administration (EIA) and Census Bureau were used to develop an understanding of the natural gas expansion process.

The EIA provides a very general decision map for natural gas pipeline development and expansion. This decision tree includes assessing consumer interest, pipeline design,

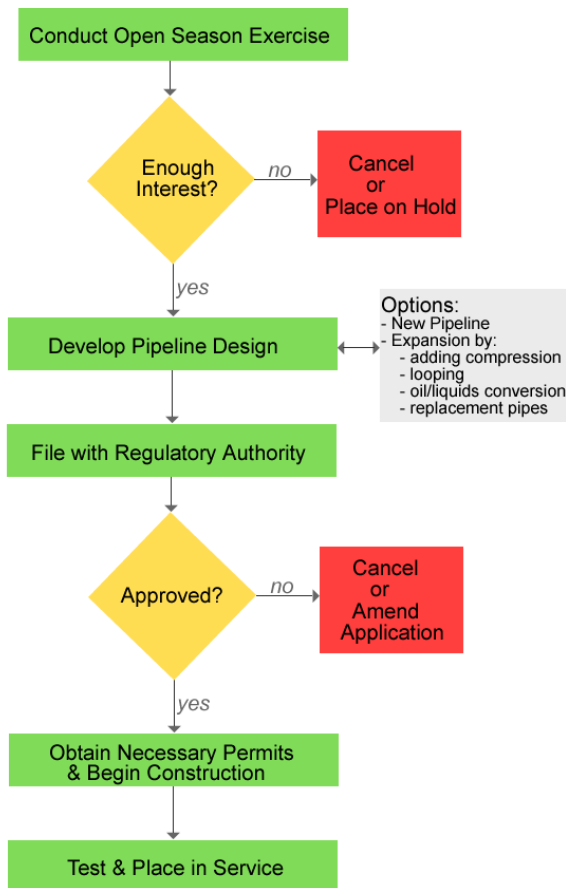


Figure 4 About U.S. Natural Gas Pipelines – Transporting Natural Gas.
http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/develop.html

regulatory approval, permitting, and finally, construction (EIA 10 2012).

Similarly, each utility is required to file the terms and conditions of service with the state. These broad formulas are publicly available.

(Maine, State of 2012). Prior to developing a pipeline design and seeking regulatory approval, the utility must first determine whether potential customer interest is great enough to justify the capital investment needed for a project.

Each utility uses a proprietary formula to calculate the return on investment (ROI) of the project

(Hepfner, Interview I 2012) (Kunz 2012).

These formulas consist of variables such as total capital investment and net revenue, among others, to calculate a net present value (NPV). The NPV is then used by the utility to decide the potential profitability of a project by comparing overall costs with revenues. If a NPV is greater than or equal to zero, a utility will cover expansion costs (Hepfner, Interview I 2012) (Kunz 2012). However, if NPV is negative, a utility will require potential customers to pay the difference, which is referred to as a “contribution in aid of construction” (CIAC)

(Kunz 2012). If potential customers are either unwilling or unable to pay the CIAC, the project will likely not proceed (Kunz 2012). Both Mr. Kunz and Mr. Hepfner listed three core variables used to determine a project's NPV. These are: the consumer interest or conversion rate; calculated therms to be used by potential consumers (revenue); and pipeline construction costs (capital investment).

Conversion Rate

The conversion rate is the percent of potential customers solicited in a potential project area that will commit to becoming a natural gas customer. Conversion generally entails the willingness to adapt natural gas as the customer's primary heat source. A common method of assessing a conversion rate is through targeted mailings seeking interest from potential customers within a specific area (Hepfner, Interview II 2012). Based on the responses received, a utility will decide whether or not to pursue the project.

Conversion rates are dependent on a number of factors such as the level of income, the existing fuel type, and building type (Hepfner, Interview II 2012). Conversion costs are often the biggest obstacle to consumer interest (Kunz 2012). For example, converting from propane may cost \$400 - \$500 per customer, while a switch from oil may cost ten times more (Hepfner, Interview II 2012). Small incentives are offered such as a \$400 rebate from MNG (Hepfner, Interview II 2012). Building type can play a role as well. Multi-tenant structures may only need one conversion, distributing costs across tenants. However, a multi-unit structure with each unit needing conversion is more costly and often leads to no conversion (Hepfner, Interview II 2012). Even with a payback period of 1 – 4 years in most instances, conversion rates are often 10% or less (Hepfner, Interview II 2012).

Therms Used

While consumer interest is important, it is perhaps the amount of gas that potential customers would consume that is the single most critical variable in determining the NPV

equation. Utilities measure fuel quantity in therms, which is typically calculated using a customer's historical fuel usage (Kunz 2012). One therm is equal to 100,000 Btu (EIA 3 2012). Building size and efficiency (insulation properties) play key roles in energy consumption (Hepfner, Interview I 2012). Annual usage of therms can range from 600 in a small condo to 50,000 therms in a big box store, and a larger building such as Fort Andross in Brunswick may consume 120,000 therms annually (Hepfner, Interview II 2012). Efficiency measures such as insulation, windows, or updated equipment such as in manufacturing also greatly affect total therms used (Hepfner, Interview II 2012). Further, multi-unit buildings may be less efficient than a single residence depending upon a landlord's investment in insulating factors and whether heat and improvement costs are absorbed by tenants (Hepfner, Interview II 2012).

The primary factors that determine the therms that would be used annually by a potential service area, or customer, are: population, population density, and the number and size of, business establishments in a given municipality. The greater each of these factors is, the greater the potential revenue generation for the gas utility.

While each variable is important, both MNG and BGC cite "anchor customers" as the primary factor for the success of a major expansion project. An anchor customer is one that will use a tremendous amount of natural gas. These customers seem to be particularly important in a state such as Maine, which exhibits both a low population and population density. An anchor customer alone may make a project attractive, or push a project area over the ROI threshold, thereby relieving other potential customers (including those within reach of the anchor customer) of paying a contribution in aid. During MNG's expansion into Freeport, L.L. Bean was their major anchor, joined by numerous smaller businesses and condo/apartment complexes (Hepfner, Interview II 2012). BGC pointed to the University of

Maine – Orono, La Bree's Bakery, Old Town Canoe, and Fort James Paper as anchors in the Orono area (Kunz 2012).

Construction Costs

Natural gas service expansion (pipeline) projects range drastically in size and cost from expansion to a municipality or industrial complex, to only one or two houses on a residential block and range in cost just as much. Delivering natural gas from the point of origin to the final customer requires a number of steps. First, gas is transported under very high pressure across a state, or indeed a country, through a major pipeline such as the Maritime pipeline in Maine.

Major pipelines are estimated to require a capital investment of \$1 to 2 million per mile (Hepfner, Interview II 2012). Tapping into a major pipeline requires a decrease in pressure (PSI) in preparation for a secondary, smaller pipeline. The pressure change is achieved through a conversion station that links the major and secondary pipelines with a cost between \$300,000 and \$400,000 (Hepfner, Interview II 2012). With a lower PSI, the secondary pipeline will be aimed toward the end customer and cost approximately \$400,000 per mile (Hepfner, Interview II 2012). Once this pipeline has reached a target, a second conversion station will be needed to further reduce the PSI so that it is fit for end-use distribution (Hepfner, Interview II 2012). Finally, service lines will bring natural gas down streets and to customers, averaging \$30 - \$60 per foot (Hepfner, Interview II 2012). The primary indicator of construction costs in Maine is the distance a project area is from one of the three major supply pipelines in the state (Hepfner, Interview II 2012).

It is worth noting that, even for towns very near a pipeline, expansion may require a sizeable contribution in aid from customers. The town of Bucksport, for instance, sought to receive natural gas service from BGC. Though the town is within approximately five miles of the Maritimes pipeline, the lack of a large enough anchor customer (even considering the

town's buildings and schools) and expansion of service would require a contribution in aid of construction totaling several hundred thousand dollars (Kunz 2012).

Neither utility's representative was able to provide a specific characteristic that defines an anchor customer, a threshold for customer distance from a major pipeline, or the level of customer interest needed to drive a project forward. Nor were they able to share further detail about their respective ROI formulas and cited them as confidential.

Key Variables, Weighted Ranks, & Service Statuses								
Municipality	* Population	Pop/Sq Mi	** Est	* & ** Est/Sq Mi	Distance to Pipeline	** n>=250 Employees	Service Status	Weighted Rank
Portland city	66,194	3,107	3,449	161.86	6.20	17	Serviced	1
Bangor city	33,039	964	1,880	54.87	2.60	11	Serviced	2
Lewiston city	36,592	1,072	1,045	30.60	5.67	13	Serviced	3
South Portland city	25,002	2,086	1,145	95.54	6.90	13	Serviced	4
Westbrook city	17,494	1,022	620	36.21	2.30	8	Serviced	5
Scarborough CDP	18,919	3,804	844	169.72	5.70	5	Serviced	6
Auburn city	23,055	389	868	14.63	5.70	9	Serviced	7
Biddeford city	21,277	707	690	22.93	3.40	4	Serviced	8
Augusta city	19,136	347	1,070	19.41	9.70	8	Unserviced	9
Waterville city	15,722	1,158	798	58.76	17.80	7	Unserviced	10
Brunswick CDP	20,278	1,398	767	52.86	11.90	4	Serviced	11
Falmouth CDP	11,185	4,565	435	177.55	3.20	2	Unserviced	12
Freeport CDP	7,879	4,591	364	212.12	6.80	6	Serviced	13
Sanford CDP	20,798	4,067	434	84.87	7.90	2	Serviced	14
Brewer city	9,482	622	356	23.37	1.57	2	Serviced	15
York Harbor CDP	12,529	3,908	358	111.67	6.90	2	Unserviced	16
Windham	17,001	365	509	10.93	0.61	1	Serviced	17
Belfast city	6,668	196	417	12.25	6.60	3	Unserviced	18
Rumford CDP	5,841	743	135	17.16	0.30	2	Unserviced	19
Gorham CDP	16,381	2,139	385	50.28	1.66	1	Serviced	20
Bar Harbor CDP	5,235	1,649	350	110.24	34.60	3	Unserviced	21
Farmington CDP	7,760	1,923	299	74.08	12.00	2	Unserviced	22
Kennebunk CDP	10,798	1,600	419	62.09	3.76	1	Serviced	23
Millinocket CDP	4,506	818	126	22.88	0.79	2	Unserviced	24
Skowhegan CDP	8,589	643	334	24.99	35.00	3	Unserviced	25
Saco city	18,482	481	548	14.25	3.39	1	Serviced	26
Ellsworth city	7,741	98	573	7.23	19.80	2	Unserviced	27
Bridgton CDP	5,210	706	196	26.57	8.29	2	Unserviced	28
Presque Isle city	9,692	128	433	5.72	114.00	2	Unserviced	29
Pittsfield CDP	4,215	449	121	12.88	23.30	4	Unserviced	30
Damariscotta CDP	2,218	642	202	58.50	12.90	2	Unserviced	31
Wells	9,589	167	333	5.79	4.00	1	Serviced	32
Old Town city	7,840	202	170	4.38	2.00	1	Serviced	33
Lisbon	9,009	395	60	2.63	0.79	1	Serviced	34
North Berwick CDP	4,576	1,433	76	23.79	0.80	1	Serviced	35
Hampden CDP	7,257	662	203	18.52	4.00	1	Serviced	36

Municipality	* Pop	Pop/Sq Mi	** Est	* & ** Est/Sq Mi	Distance to Pipeline	** n> = 250 Emp	Service Status	Weighted Rank
Calais city	3,123	91	152	4.43	1.00	1	Unserviced	37
Standish CDP	9,874	3,687	152	56.76	8.20	1	Unserviced	38
Dover-Foxcroft CDP	4,213	503	136	16.23	33.00	2	Unserviced	39
Norway CDP	5,014	994	150	29.73	5.19	1	Unserviced	40
Bath city	8,514	936	339	37.26	19.00	1	Serviced	41
Jay	4,851	100	73	1.51	1.50	1	Unserviced	42
New Gloucester	5,542	118	136	2.89	4.19	1	Serviced	43
Newry	329	5	20	0.33	0.20	1	Unserviced	44
Morrill	884	53	19	1.15	0.37	1	Unserviced	45
Madawaska CDP	4,035	763	97	18.33	160.00	2	Unserviced	46
Oakland CDP	6,240	1,154	166	30.71	18.40	1	Unserviced	47
West Kennebunk CDP	1,176	338	13	3.74	1.42	1	Unserviced	48
Guilford CDP	1,521	793	52	27.11	40.70	2	Unserviced	49
Bucksport CDP	4,924	432	123	10.78	6.25	1	Unserviced	50
Farmingdale CDP	2,956	1,240	60	25.17	5.86	1	Unserviced	51
Houlton CDP	6,123	1,165	325	61.85	75.00	1	Unserviced	52
Rockport	3,330	154	232	10.72	15.30	1	Unserviced	53
Lincoln CDP	5,085	685	205	27.61	23.50	1	Unserviced	54
Poland	5,376	127	82	1.94	8.62	1	Unserviced	55
Baileyville	1,521	41	41	1.10	4.00	1	Unserviced	56
Fryeburg CDP	3,449	1,158	108	36.25	20.08	1	Unserviced	57
Hollis Center	4,281	134	72	2.25	9.98	1	Unserviced	58
Caribou city	8,189	103	255	3.22	127.00	1	Unserviced	59
Blue Hill CDP	2,686	573	134	28.58	21.60	1	Unserviced	60
Fort Kent CDP	4,097	762	216	40.17	150.00	1	Unserviced	61
Kingfield	997	23	76	1.76	20.00	1	Unserviced	62
Norridgewock CDP	3,367	317	58	5.47	30.80	1	Unserviced	63
Rangeley	1,168	28	95	2.29	28.90	1	Unserviced	64
Palmyra	1,986	49	39	0.97	25.50	1	Unserviced	65
Easton	1,287	33	18	0.46	111.00	1	Unserviced	66
Source 1 * http://quickfacts.census.gov/qfd/states/23000.html								
Source 2 ** https://www.census.gov/econ/cbp/								

Methodology

Data Collection

In order to create criteria similar to those used by utilities and identify potential service areas in Maine, the three primary variables relied upon by utilities were considered. These are: consumer interest (in fuel conversion), therms used (by potential customers), and pipeline construction costs. Due to limited resources, the focus of this report is strictly on the latter two variables. While customer interest is important to the overall process used by utilities, assessing levels of interest across many municipalities in Maine would be both

impractical and cost prohibitive for a reconnaissance-level study. Furthermore, utilities first assess construction costs and potential terms used to determine project feasibility prior to researching customer interest (Hepfner, Interview II 2012).

Terms Used: population, density and the number of business establishments

Data for the model were assembled from several publicly available sources. First, U.S. Census Bureau data were utilized for population, population density, total number of establishments, as well as establishments ranked by the number of employees. These data were used to assess a municipality's potential to consume natural gas and thereby represent terms used. Specifically, population data, including density were drawn from U.S. Census "Quick Facts" data (U.S. Census Bureau 2012). Two data classifications were used for demographic data. "Incorporated Places" (City) Data were used wherever available. This classification provides demographic data for the geographical boundaries of an entire city or town. Census "Designated Places" (CDP) represent a population concentration. Consequently, density figures cannot be evenly compared across data types. "The number and size of business establishments were determined using ZIP Code Business Patterns (ZBP) data (U.S. Census Bureau 2012). Finally, municipalities were categorized as serviced or unserved. Lists of serviced municipalities were found at each of the respective utility's websites (Unitil 2012) (Bangor Natural Gas 2012) (Maine Natural Gas 2012).

Because anchor customers are crucial for service expansion, establishment size was targeted first to narrow the list of potential candidate towns for natural gas service. A pattern emerged in that each serviced community was found to have at least one establishment with 250 or more employees. Therefore, adopting this as a criterion for anchor customers provided a starting point for narrowing the search. Of the initial 452 municipalities in Maine for which data were available, 66 had at least one establishment with 250 or more employees, 23 of which already had natural gas service (See Appendix A).

Construction Costs and Distance from Pipeline

With the list narrowed to 66 municipalities, distances from municipalities to the nearest pipeline were needed to estimate potential construction costs. Because specific coordinates for the location and pathways of the three major pipelines could not be obtained, publicly available utility maps were used to assess pipeline entry points into the Maine and then were manually laid out on Google Earth using key landmarks on the utility map such as county boundaries, bodies of water, county lines, and other identifying information (Maritimes 2012). Then, using Google Earth satellite imagery of Maine, an approximate representative natural gas pipeline layer was created. Lines were then drawn and measured to demarcate the shortest distance between a municipalities estimated center and the nearest major pipeline. These distances are estimates and do not reflect limitations in pipeline design that may be caused by policy and legal limitations on development due to factors such as environmental regulation, rights to land, etc.

Applying the Criteria

Rank Ordering the Potential Candidates

Municipalities were then ranked against each other (1-66) for each of the 6 variables (population, the population per square mile, total business establishments, total business establishments per square mile, the number of establishments with at least 250 employees, and the distance of the municipality to one of the three major pipelines) with the lower ranking reflecting the greatest consistency with natural gas service. Ranks were then summed across each variable for all towns and those with the lowest score were considered to have the highest raw rank. A qualitative coefficient was then assigned to each variable in order to rank the most likely candidates for natural gas service. Five integrations

of the equation adjusted until the resulting list of potential new clients reflected the characteristics of the currently serviced municipalities.

Anchor customers are seemingly essential to each service expansion and were assigned the highest weight of 40%. With construction costs being the largest hurdle to gas expansion, distance to pipeline was weighed next at 30%. Serviced municipalities with relatively long distances to a major pipeline either had a large number of anchor customers, a large population, or both. While population is a key indicator, towns with lower populations may still have natural gas service depending on anchor customers and distance to pipeline. Specific densities such as that of population and establishments were less relevant than initially estimated and were weighted at 5% and 2.5% respectively. Some of the least dense municipalities were found to be near the top of all other categories.

Sample (n) Median Comparisons						
Category	Mdn Population	Population Density	Mdn Number of Ests	Mdn Est/Sq Mi	Mdn Distance Major Pipeline	Mdn Est n>=250
All	6,182	653	204	23	7	1
Serviced	17,001	964	434	31	4	2
Top 5	33,039	1,072	1,145	55	6	13
Top 10	22,166	1,235	856	54	6	9
Unserviced	4,506	503	136	17	15	1
Top 5	12,529	1,158	435	59	7	3
Top 10	8,175	988	354	42	8	3

Characteristics of all Communities

The median population for all municipalities in this study was 6,182 with a population density of 653 people per square mile. The median number of establishments was 204 for all municipalities while the overall establishment density was 23 businesses per square mile. The median number of establishments with more than 250 employees for all municipalities was 1. Finally, the median distance from a major pipeline for all municipalities was 7 miles.

Characteristics of Unserved Communities

The median population for unserved municipalities was 4,506 while the median for the top 5 and 10 unserved communities was 12,529 and 8,175 collectively. The median population density for these communities was 503 per square mile, while the top 5 and 10 totaled densities of 1,158 and 988 respectively. The median number of establishments for unserved municipalities was 136 with a median of 435 for the top 5 and 354 for the top 10. The establishment density was 17 per square mile for all unserved communities in the study and 59 and 42 for the top 5 and 10 respectively. The median number of establishments with 250 or more employees for all of the unserved population was 1, while both the top 5 and 10 communities had a median of 3. The median distance of unserved communities from a major pipeline was 15 miles. The top 5 had a median distance of 7 miles, and the top 10 were a median distance of 8 miles.

Characteristics of Served Municipalities

The median population for all serviced communities in this study was 17,001. The median population of the five most populous serviced communities was 33,039, while the median of the top ten was 22,166. The median population density of all serviced municipalities was 964 people per square mile. The densities for the top five and ten communities were 1,072 and 1,235 people per square mile, respectively. The median number of establishments for all serviced towns in this study was 434, while the top five and ten had medians of 1,145 and 856, respectively. Served municipalities had a median of 31 establishments per square mile, with the top 5 and 10 communities being significantly denser with 55 and 54 establishments per square mile. The median number of establishments with ≥ 250 employees was 2 for all serviced communities. However, the median for the top five serviced municipalities was 13, and for the top ten, the median was

9. Finally, the median distance from the nearest major pipeline was 4 miles for serviced communities. The medians for the top five and ten both equaled six miles.

Results and Discussion

Characteristics of Potential Expansion Targets

Augusta, City

Augusta's population of 19,136 is the 9th highest in the state and greater than that of the median serviced population. The population density is approximately half the median of all serviced communities at 347 people per square mile. However, with 1,070 total business establishments, Augusta ranks 4th of all surveyed municipalities for the number of business. Augusta's establishment density was just under the population median for serviced communities at 19 establishments per square mile. The number of establishments with 250 or more employees totaled 8 and is tied at 6th with Westbrook among all surveyed communities. Finally, Augusta's distance to the nearest major pipeline was 9.70 miles, more than twice the distance of the serviced community median, but somewhat closer to the 6 mile distance of both the top 5 and 10 serviced municipalities. While Augusta has both low population and business densities, the overall population, number and size of establishments likely mean a relatively high consumption rate and make the city an attractive target for natural gas expansion.

Waterville, City

Waterville's population is 15,722, making it the 15th most populous city in the state and close to the median population for all serviced communities. The population density was 1,158 people per square mile, which is higher than that of the top 5 serviced communities. The total establishments in Waterville totaled 798, almost twice the median of that of serviced communities. Waterville's establishment density was roughly 59 businesses

per square mile, which would rank it among the top 5 for serviced municipalities. With seven establishments totaling 250 or more employees, Waterville had significantly more than the serviced median of two; this is just below that of the median for the top ten serviced towns. Waterville's distance to the nearest pipeline is close to 18 miles, which is a significantly greater than the median for serviced towns and greater than that for all but two of the serviced communities. Ranking near the top of every category except for its distance to a major pipeline, Waterville is still a strong candidate for receiving service.

Falmouth, CDP

Falmouth's population is 11,185, nearly twice that of the serviced population median, but almost half that of the top 10 serviced municipalities. The population density of Falmouth is 4,565 people per square mile, significantly higher than the 707 people per square mile median of the serviced towns. Falmouth's population density was also significantly higher than that of the majority of all municipalities. This large disparity is attributable to Falmouth's population density being calculated as a CDP and is not a true representation of the municipality's population density, which is likely, much lower than that of the CDP. Falmouth had 435 establishments total, which is on par with the median for all serviced communities. Establishment density (establishments/square mile) appeared incredibly high, similarly to population density, and is also attributable to the CDP classification. The number of establishments in Falmouth with 250 or more employees totaled two, equal to the median for serviced communities. Finally, the measured distance from Falmouth to the nearest pipeline was only 3.2 miles, which is a shorter distance than that of all but two of the top ten serviced communities.

Characteristics of Unlikely and Bubble Candidates

Several of the municipalities are simply too far from a major pipeline to receive natural gas. Madawaska, Fort Kent, Caribou, Presque Isle, and Easton are all more than 100

miles from a major pipeline. Houlton is 75 miles from one. These towns all share several key variables with serviced communities including anchor customers, population, and number of establishments; however, construction costs would likely remove each of these candidates from consideration for natural gas expansion.

Some towns, despite their relatively long distances from a major pipeline, could receive natural gas service. Receiving natural gas via pipeline would be dependent upon expansion to towns or business between them and the pipeline. For example, Bar Harbor has a large pool of establishments, requisite anchor customers, and is a desirable candidate except for being approximately 34 miles from a major pipeline. Bucksport and Ellsworth, both candidate municipalities, lie between Bar Harbor and a pipeline. If Bucksport and then Ellsworth were to receive natural gas, Bar Harbor's distance would become much more manageable obstacle.

Population/Establishment issues

Other towns may be within only a few miles a pipeline but lack demand characteristics such as an anchor customer or a large number of residents and establishments to create an NPV of zero. Other towns may have an anchor customer that has brought the pipeline near the municipalities, but the town may not be large enough to warrant expansion beyond the anchor customer. Bucksport, Jay, and Rumford are all examples of towns that are within 6 miles of a major pipeline, but local demand outside of their anchor customers has prevented further expansion.

Topics for further research

This report sets the stage for further avenues of exploration of Maine's natural gas future. Understanding construction costs more fully through a more detailed report on pipeline distance including environmental and other regulatory factors would increase the precision of the current distance-to-pipeline measure. Additionally, the categorization of

potential anchor customers by specific industry would give further insight into the potential for therms to be used by targeted establishments. Further, investigation into the relatively low greenhouse gas emissions produced by natural gas, compared to other carbon fuels, would bolster considerations for the fuel's expansion.

Policy Implications

Natural gas has the potential to save Maine customers money. While some of Maine's municipalities seem ripe for service expansion, others will be out of consideration when utilities consider the NPV. As some residential and commercial customers may pay an upfront cost toward construction, municipalities might be well served by considering paying a contribution in aid of construction. Doing so may lower energy costs for the town, but may have the potential to cause direct positive economic repercussions for residential and commercial energy customers as well.

A cost-benefit analysis of the total economic impact can be calculated when weighing the decision. If the economic benefit over a given period of time is positive, then the contribution should be seriously considered. The benefits would not be limited to energy savings for current building owners. Once the town receives some natural gas, service would then become easier to expand to even more customers in the area. Also, local natural gas service could become a selling point used by the municipality for economic development. As we have seen, businesses and residents save money when converting to natural gas. It is reasonable then that businesses and real estate developers would see a natural gas fuel source as a selling point.

Conclusion

The appeal and benefit of natural gas has increased in recent years due to growing proven reserves, and the characteristics of natural gas itself. Newer natural gas drilling technologies have led to abundant proven reserves. In turn, the increased production and supply has driven down the market price of natural gas to be very competitive with other carbon fuels such as coal and oil. Additionally, natural gas has proven as a very versatile fuel source contributing significantly as a fuel source for three of the four major energy sectors. Maine can benefit economically from continued expansion of natural gas to its business establishments and municipalities.

Maine does have access to natural gas through three major pipelines running through the state, but challenges for expansion exist. Capital investment from utilities is significant for service expansion to occur. Maine's demographic characteristics such as population, population density, and the number of large business establishments present a particular challenge to utilities who need to find at least a neutral NPV for potential projects. However, potential customers such as the town of Bucksport may find that paying a contribution in aid of construction to be a worthwhile investment in their economic future.

Analyzing Maine's serviced communities has given insight into the requirements for natural gas expansion, while applying these lessons has given insight into the possibility for further service expansion within the state. Many municipalities were found to possess the requisite characteristics that utilities desire for service expansion. Natural gas is a desirable alternative to other carbon fuels and, with increased availability, can help Maine meet its energy needs in many ways for decades to come.

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Appendix A – Please see PDF

Municipality Data			
zip	NAME	cty_name	Population
4105	Portland city	CUMBERLAND	66194
4032, 4033, 4034	Bangor city	PENOBSCOT	33039
4070, 4074	Lewiston city	ANDROSCOGGIN	36592
4101, 4102, 4103, 4104, 4109, 4112, 4122	South Portland city	CUMBERLAND	25002
3909	Westbrook city	CUMBERLAND	17494
4609	Scarborough CDP	CUMBERLAND	18919
4073	Auburn city	ANDROSCOGGIN	23055
4938	Biddeford city	YORK	21277
4543	Augusta city	KENNEBEC	19136
4038	Waterville city	KENNEBEC	15722
4011	Brunswick CDP	CUMBERLAND	20278
4106, 4116	Falmouth CDP	CUMBERLAND	11185
4743	Freeport CDP	CUMBERLAND	7879
4084	Sanford CDP	YORK	20798
4530	Brewer city	PENOBSCOT	9482
4037	York Harbor CDP	YORK	12529
4730	Windham	CUMBERLAND	17001
4240, 4241, 4243	Belfast city	WALDO	6668
4092, 4098	Rumford CDP	OXFORD	5841
4043	Gorham CDP	CUMBERLAND	16381
4462	Bar Harbor CDP	HANCOCK	5235
4457	Farmington CDP	FRANKLIN	7760
4901, 4903	Kennebunk CDP	YORK	10798
4009	Millinocket CDP	PENOBSCOT	4506
4756	Skowhegan CDP	SOMERSET	8589
4401, 4402	Saco city	YORK	18482
4005, 4007	Ellsworth city	HANCOCK	7741
4444	Bridgton CDP	CUMBERLAND	5210
4072	Presque Isle city	AROOSTOOK	9692
4260	Pittsfield CDP	SOMERSET	4215
4915	Damariscotta CDP	LINCOLN	2218
4963	Wells	YORK	9589
4614	Old Town city	PENOBSCOT	7840
4976	Lisbon	ANDROSCOGGIN	9009
3906	North Berwick CDP	YORK	4576
4443	Hampden CDP	PENOBSCOT	7257

4330, 4332, 4333, 4336, 4338	Calais city	WASHINGTON	3123
4268	Standish CDP	CUMBERLAND	9874
4970	Dover-Foxcroft CDP	PISCATAQUIS	4213
4412	Norway CDP	OXFORD	5014
4344	Bath city	SAGADAHOC	8514
4967	Jay	FRANKLIN	4851
4276	New Gloucester	CUMBERLAND	5542
4769	Newry	OXFORD	329
4090	Morrill	WALDO	884
4947	Madawaska CDP	AROOSTOOK	4035
4426	Oakland CDP	KENNEBEC	6240
4957	West Kennebunk CDP	YORK	1176
4239	Guilford CDP	PISCATAQUIS	1521
4062	Bucksport CDP	HANCOCK	4924
4856	Farmingdale CDP	KENNEBEC	2956
4210, 4211, 4212	Houlton CDP	AROOSTOOK	6123
4605	Rockport	KNOX	3330
4416	Lincoln CDP	PENOBSCOT	5085
4468	Poland	ANDROSCOGGIN	5376
4042	Baileyville	WASHINGTON	1521
4736	Fryeburg CDP	OXFORD	3449
4274	Hollis Center	YORK	4281
4619	Caribou city	AROOSTOOK	8189
4250	Blue Hill CDP	HANCOCK	2686
4094	Fort Kent CDP	AROOSTOOK	4097
4694	Kingfield	FRANKLIN	997
4952	Norridgewock CDP	SOMERSET	3367
4965	Rangeley	FRANKLIN	1168
4740	Palmyra	SOMERSET	1986
4261	Easton	AROOSTOOK	1287

Population						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	15.00%	7.50%	10.00%	15.00%	10.00%	
Unweighted Rank	5	4	3	2	1	Pop/Sq Mi
1	0.15	0.08	0.10	0.15	0.10	3107
3	0.45	0.23	0.30	0.45	0.30	964
2	0.30	0.15	0.20	0.30	0.20	1072
4	0.60	0.30	0.40	0.60	0.40	2086
12	1.80	0.90	1.20	1.80	1.20	1022
10	1.50	0.75	1.00	1.50	1.00	3804
5	0.75	0.38	0.50	0.75	0.50	389
6	0.90	0.45	0.60	0.90	0.60	707
9	1.35	0.68	0.90	1.35	0.90	347
15	2.25	1.13	1.50	2.25	1.50	1158
8	1.20	0.60	0.80	1.20	0.80	1398
17	2.55	1.28	1.70	2.55	1.70	4565
27	4.05	2.03	2.70	4.05	2.70	4591
7	1.05	0.53	0.70	1.05	0.70	4067
22	3.30	1.65	2.20	3.30	2.20	622
16	2.40	1.20	1.60	2.40	1.60	3908
13	1.95	0.98	1.30	1.95	1.30	365
32	4.80	2.40	3.20	4.80	3.20	196
35	5.25	2.63	3.50	5.25	3.50	743
14	2.10	1.05	1.40	2.10	1.40	2139
38	5.70	2.85	3.80	5.70	3.80	1649
29	4.35	2.18	2.90	4.35	2.90	1923
18	2.70	1.35	1.80	2.70	1.80	1600
45	6.75	3.38	4.50	6.75	4.50	818
24	3.60	1.80	2.40	3.60	2.40	643
11	1.65	0.83	1.10	1.65	1.10	481
30	4.50	2.25	3.00	4.50	3.00	98
39	5.85	2.93	3.90	5.85	3.90	706
20	3.00	1.50	2.00	3.00	2.00	128
47	7.05	3.53	4.70	7.05	4.70	449
57	8.55	4.28	5.70	8.55	5.70	642
21	3.15	1.58	2.10	3.15	2.10	167
28	4.20	2.10	2.80	4.20	2.80	202
23	3.45	1.73	2.30	3.45	2.30	395
44	6.60	3.30	4.40	6.60	4.40	1433
31	4.65	2.33	3.10	4.65	3.10	662

54	8.10	4.05	5.40	8.10	5.40	91
19	2.85	1.43	1.90	2.85	1.90	3687
48	7.20	3.60	4.80	7.20	4.80	503
41	6.15	3.08	4.10	6.15	4.10	994
25	3.75	1.88	2.50	3.75	2.50	936
43	6.45	3.23	4.30	6.45	4.30	100
36	5.40	2.70	3.60	5.40	3.60	118
66	9.90	4.95	6.60	9.90	6.60	5
65	9.75	4.88	6.50	9.75	6.50	53
50	7.50	3.75	5.00	7.50	5.00	763
33	4.95	2.48	3.30	4.95	3.30	1154
62	9.30	4.65	6.20	9.30	6.20	338
60	9.00	4.50	6.00	9.00	6.00	793
42	6.30	3.15	4.20	6.30	4.20	432
55	8.25	4.13	5.50	8.25	5.50	1240
34	5.10	2.55	3.40	5.10	3.40	1165
53	7.95	3.98	5.30	7.95	5.30	154
40	6.00	3.00	4.00	6.00	4.00	685
37	5.55	2.78	3.70	5.55	3.70	127
59	8.85	4.43	5.90	8.85	5.90	41
51	7.65	3.83	5.10	7.65	5.10	1158
46	6.90	3.45	4.60	6.90	4.60	134
26	3.90	1.95	2.60	3.90	2.60	103
56	8.40	4.20	5.60	8.40	5.60	573
49	7.35	3.68	4.90	7.35	4.90	762
64	9.60	4.80	6.40	9.60	6.40	23
52	7.80	3.90	5.20	7.80	5.20	317
63	9.45	4.73	6.30	9.45	6.30	28
58	8.70	4.35	5.80	8.70	5.80	49
61	9.15	4.58	6.10	9.15	6.10	33

Population Density						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	2.50%	2.50%	0.00%	0.00%	5.00%	
Unweighted Rank	5	4	3	2	1	Est
7	0.18	0.18	0.00	0.00	0.35	3449
23	0.58	0.58	0.00	0.00	1.15	1880
20	0.50	0.50	0.00	0.00	1.00	1045
9	0.23	0.23	0.00	0.00	0.45	1145
21	0.53	0.53	0.00	0.00	1.05	620
5	0.13	0.13	0.00	0.00	0.25	844
43	1.08	1.08	0.00	0.00	2.15	868
30	0.75	0.75	0.00	0.00	1.50	690
45	1.13	1.13	0.00	0.00	2.25	1070
17	0.43	0.43	0.00	0.00	0.85	798
14	0.35	0.35	0.00	0.00	0.70	767
2	0.05	0.05	0.00	0.00	0.10	435
1	0.03	0.03	0.00	0.00	0.05	364
3	0.08	0.08	0.00	0.00	0.15	434
36	0.90	0.90	0.00	0.00	1.80	356
4	0.10	0.10	0.00	0.00	0.20	358
44	1.10	1.10	0.00	0.00	2.20	509
49	1.23	1.23	0.00	0.00	2.45	417
29	0.73	0.73	0.00	0.00	1.45	135
8	0.20	0.20	0.00	0.00	0.40	385
11	0.28	0.28	0.00	0.00	0.55	350
10	0.25	0.25	0.00	0.00	0.50	299
12	0.30	0.30	0.00	0.00	0.60	419
25	0.63	0.63	0.00	0.00	1.25	126
34	0.85	0.85	0.00	0.00	1.70	334
39	0.98	0.98	0.00	0.00	1.95	548
58	1.45	1.45	0.00	0.00	2.90	573
31	0.78	0.78	0.00	0.00	1.55	196
53	1.33	1.33	0.00	0.00	2.65	433
40	1.00	1.00	0.00	0.00	2.00	121
35	0.88	0.88	0.00	0.00	1.75	202
50	1.25	1.25	0.00	0.00	2.50	333
48	1.20	1.20	0.00	0.00	2.40	170
42	1.05	1.05	0.00	0.00	2.10	60
13	0.33	0.33	0.00	0.00	0.65	76
33	0.83	0.83	0.00	0.00	1.65	203

59	1.48	1.48	0.00	0.00	2.95	152
6	0.15	0.15	0.00	0.00	0.30	152
38	0.95	0.95	0.00	0.00	1.90	136
22	0.55	0.55	0.00	0.00	1.10	150
24	0.60	0.60	0.00	0.00	1.20	339
57	1.43	1.43	0.00	0.00	2.85	73
55	1.38	1.38	0.00	0.00	2.75	136
66	1.65	1.65	0.00	0.00	3.30	20
60	1.50	1.50	0.00	0.00	3.00	19
27	0.68	0.68	0.00	0.00	1.35	97
19	0.48	0.48	0.00	0.00	0.95	166
46	1.15	1.15	0.00	0.00	2.30	13
26	0.65	0.65	0.00	0.00	1.30	52
41	1.03	1.03	0.00	0.00	2.05	123
15	0.38	0.38	0.00	0.00	0.75	60
16	0.40	0.40	0.00	0.00	0.80	325
51	1.28	1.28	0.00	0.00	2.55	232
32	0.80	0.80	0.00	0.00	1.60	205
54	1.35	1.35	0.00	0.00	2.70	82
62	1.55	1.55	0.00	0.00	3.10	41
18	0.45	0.45	0.00	0.00	0.90	108
52	1.30	1.30	0.00	0.00	2.60	72
56	1.40	1.40	0.00	0.00	2.80	255
37	0.93	0.93	0.00	0.00	1.85	134
28	0.70	0.70	0.00	0.00	1.40	216
65	1.63	1.63	0.00	0.00	3.25	76
47	1.18	1.18	0.00	0.00	2.35	58
64	1.60	1.60	0.00	0.00	3.20	95
61	1.53	1.53	0.00	0.00	3.05	39
63	1.58	1.58	0.00	0.00	3.15	18

Total Establishments						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	20.00%	7.50%	10.00%	15.00%	10.00%	
Unweighted Rank	5	4	3	2	1	Est/Sq Mi
1	0.20	0.08	0.10	0.15	0.10	161.86
2	0.40	0.15	0.20	0.30	0.20	54.87
5	1.00	0.38	0.50	0.75	0.50	30.60
3	0.60	0.23	0.30	0.45	0.30	95.54
11	2.20	0.83	1.10	1.65	1.10	36.21
7	1.40	0.53	0.70	1.05	0.70	169.72
6	1.20	0.45	0.60	0.90	0.60	14.63
10	2.00	0.75	1.00	1.50	1.00	22.93
4	0.80	0.30	0.40	0.60	0.40	19.41
8	1.60	0.60	0.80	1.20	0.80	58.76
9	1.80	0.68	0.90	1.35	0.90	52.86
15	3.00	1.13	1.50	2.25	1.50	177.55
21	4.20	1.58	2.10	3.15	2.10	212.12
16	3.20	1.20	1.60	2.40	1.60	84.87
23	4.60	1.73	2.30	3.45	2.30	23.37
22	4.40	1.65	2.20	3.30	2.20	111.67
14	2.80	1.05	1.40	2.10	1.40	10.93
19	3.80	1.43	1.90	2.85	1.90	12.25
44	8.80	3.30	4.40	6.60	4.40	17.16
20	4.00	1.50	2.00	3.00	2.00	50.28
24	4.80	1.80	2.40	3.60	2.40	110.24
29	5.80	2.18	2.90	4.35	2.90	74.08
18	3.60	1.35	1.80	2.70	1.80	62.09
46	9.20	3.45	4.60	6.90	4.60	22.88
26	5.20	1.95	2.60	3.90	2.60	24.99
13	2.60	0.98	1.30	1.95	1.30	14.25
12	2.40	0.90	1.20	1.80	1.20	7.23
36	7.20	2.70	3.60	5.40	3.60	26.57
17	3.40	1.28	1.70	2.55	1.70	5.72
48	9.60	3.60	4.80	7.20	4.80	12.88
35	7.00	2.63	3.50	5.25	3.50	58.50
27	5.40	2.03	2.70	4.05	2.70	5.79
37	7.40	2.78	3.70	5.55	3.70	4.38
58	11.60	4.35	5.80	8.70	5.80	2.63
53	10.60	3.98	5.30	7.95	5.30	23.79
34	6.80	2.55	3.40	5.10	3.40	18.52

40	8.00	3.00	4.00	6.00	4.00	4.43
39	7.80	2.93	3.90	5.85	3.90	56.76
42	8.40	3.15	4.20	6.30	4.20	16.23
41	8.20	3.08	4.10	6.15	4.10	29.73
25	5.00	1.88	2.50	3.75	2.50	37.26
55	11.00	4.13	5.50	8.25	5.50	1.51
43	8.60	3.23	4.30	6.45	4.30	2.89
63	12.60	4.73	6.30	9.45	6.30	0.33
64	12.80	4.80	6.40	9.60	6.40	1.15
50	10.00	3.75	5.00	7.50	5.00	18.33
38	7.60	2.85	3.80	5.70	3.80	30.71
66	13.20	4.95	6.60	9.90	6.60	3.74
60	12.00	4.50	6.00	9.00	6.00	27.11
47	9.40	3.53	4.70	7.05	4.70	10.78
57	11.40	4.28	5.70	8.55	5.70	25.17
28	5.60	2.10	2.80	4.20	2.80	61.85
31	6.20	2.33	3.10	4.65	3.10	10.72
33	6.60	2.48	3.30	4.95	3.30	27.61
52	10.40	3.90	5.20	7.80	5.20	1.94
61	12.20	4.58	6.10	9.15	6.10	1.10
49	9.80	3.68	4.90	7.35	4.90	36.25
56	11.20	4.20	5.60	8.40	5.60	2.25
30	6.00	2.25	3.00	4.50	3.00	3.22
45	9.00	3.38	4.50	6.75	4.50	28.58
32	6.40	2.40	3.20	4.80	3.20	40.17
54	10.80	4.05	5.40	8.10	5.40	1.76
59	11.80	4.43	5.90	8.85	5.90	5.47
51	10.20	3.83	5.10	7.65	5.10	2.29
62	12.40	4.65	6.20	9.30	6.20	0.97
65	13.00	4.88	6.50	9.75	6.50	0.46

Establishment Density						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	7.50%	2.50%	10.00%	10.00%	2.50%	
Unweighted Rank	5	4	3	2	1	Distance
4	0.30	0.10	0.40	0.40	0.10	6.20
15	1.13	0.38	1.50	1.50	0.38	2.60
23	1.73	0.58	2.30	2.30	0.58	5.67
7	0.53	0.18	0.70	0.70	0.18	6.90
21	1.58	0.53	2.10	2.10	0.53	2.30
3	0.23	0.08	0.30	0.30	0.08	5.70
40	3.00	1.00	4.00	4.00	1.00	5.70
33	2.48	0.83	3.30	3.30	0.83	3.40
35	2.63	0.88	3.50	3.50	0.88	9.70
12	0.90	0.30	1.20	1.20	0.30	17.80
16	1.20	0.40	1.60	1.60	0.40	11.90
2	0.15	0.05	0.20	0.20	0.05	3.20
1	0.08	0.03	0.10	0.10	0.03	6.80
8	0.60	0.20	0.80	0.80	0.20	7.90
32	2.40	0.80	3.20	3.20	0.80	1.57
5	0.38	0.13	0.50	0.50	0.13	6.9
44	3.30	1.10	4.40	4.40	1.10	0.61
43	3.23	1.08	4.30	4.30	1.08	6.60
38	2.85	0.95	3.80	3.80	0.95	0.30
17	1.28	0.43	1.70	1.70	0.43	1.66
6	0.45	0.15	0.60	0.60	0.15	34.60
9	0.68	0.23	0.90	0.90	0.23	12.00
10	0.75	0.25	1.00	1.00	0.25	3.76
34	2.55	0.85	3.40	3.40	0.85	0.79
30	2.25	0.75	3.00	3.00	0.75	35.00
41	3.08	1.03	4.10	4.10	1.03	3.39
47	3.53	1.18	4.70	4.70	1.18	19.80
28	2.10	0.70	2.80	2.80	0.70	8.29
49	3.68	1.23	4.90	4.90	1.23	114.00
42	3.15	1.05	4.20	4.20	1.05	23.30
13	0.98	0.33	1.30	1.30	0.33	12.90
48	3.60	1.20	4.80	4.80	1.20	4.00
52	3.90	1.30	5.20	5.20	1.30	2.00
56	4.20	1.40	5.60	5.60	1.40	0.79
31	2.33	0.78	3.10	3.10	0.78	0.80
36	2.70	0.90	3.60	3.60	0.90	4.00

51	3.83	1.28	5.10	5.10	1.28	1.00
14	1.05	0.35	1.40	1.40	0.35	8.20
39	2.93	0.98	3.90	3.90	0.98	33.00
24	1.80	0.60	2.40	2.40	0.60	5.19
19	1.43	0.48	1.90	1.90	0.48	19.00
61	4.58	1.53	6.10	6.10	1.53	1.50
55	4.13	1.38	5.50	5.50	1.38	4.19
66	4.95	1.65	6.60	6.60	1.65	0.20
62	4.65	1.55	6.20	6.20	1.55	0.37
37	2.78	0.93	3.70	3.70	0.93	160.00
22	1.65	0.55	2.20	2.20	0.55	18.40
53	3.98	1.33	5.30	5.30	1.33	1.42
27	2.03	0.68	2.70	2.70	0.68	40.70
45	3.38	1.13	4.50	4.50	1.13	6.25
29	2.18	0.73	2.90	2.90	0.73	5.86
11	0.83	0.28	1.10	1.10	0.28	75.00
46	3.45	1.15	4.60	4.60	1.15	15.30
26	1.95	0.65	2.60	2.60	0.65	23.50
59	4.43	1.48	5.90	5.90	1.48	8.62
63	4.73	1.58	6.30	6.30	1.58	4.00
20	1.50	0.50	2.00	2.00	0.50	20.08
58	4.35	1.45	5.80	5.80	1.45	9.98
54	4.05	1.35	5.40	5.40	1.35	127.00
25	1.88	0.63	2.50	2.50	0.63	21.60
18	1.35	0.45	1.80	1.80	0.45	150.00
60	4.50	1.50	6.00	6.00	1.50	20.00
50	3.75	1.25	5.00	5.00	1.25	30.80
57	4.28	1.43	5.70	5.70	1.43	28.90
64	4.80	1.60	6.40	6.40	1.60	25.50
65	4.88	1.63	6.50	6.50	1.63	111.00

Distance to Pipeline						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	15.00%	40.00%	30.00%	20.00%	30.00%	
Unweighted Rank	5	4	3	2	1	n>=250
29	4.35	11.60	8.70	5.80	8.70	17
15	2.25	6.00	4.50	3.00	4.50	11
25	3.75	10.00	7.50	5.00	7.50	13
34	5.10	13.60	10.20	6.80	10.20	13
14	2.10	5.60	4.20	2.80	4.20	8
26	3.90	10.40	7.80	5.20	7.80	5
27	4.05	10.80	8.10	5.40	8.10	9
18	2.70	7.20	5.40	3.60	5.40	4
39	5.85	15.60	11.70	7.80	11.70	8
45	6.75	18.00	13.50	9.00	13.50	7
41	6.15	16.40	12.30	8.20	12.30	4
16	2.40	6.40	4.80	3.20	4.80	2
32	4.80	12.80	9.60	6.40	9.60	6
35	5.25	14.00	10.50	7.00	10.50	2
11	1.65	4.40	3.30	2.20	3.30	2
33	4.95	13.20	9.90	6.60	9.90	2
4	0.60	1.60	1.20	0.80	1.20	1
31	4.65	12.40	9.30	6.20	9.30	3
2	0.30	0.80	0.60	0.40	0.60	2
12	1.80	4.80	3.60	2.40	3.60	1
58	8.70	23.20	17.40	11.60	17.40	3
42	6.30	16.80	12.60	8.40	12.60	2
19	2.85	7.60	5.70	3.80	5.70	1
5	0.75	2.00	1.50	1.00	1.50	2
59	8.85	23.60	17.70	11.80	17.70	3
17	2.55	6.80	5.10	3.40	5.10	1
48	7.20	19.20	14.40	9.60	14.40	2
37	5.55	14.80	11.10	7.40	11.10	2
63	9.45	25.20	18.90	12.60	18.90	2
52	7.80	20.80	15.60	10.40	15.60	4
43	6.45	17.20	12.90	8.60	12.90	2
21	3.15	8.40	6.30	4.20	6.30	1
13	1.95	5.20	3.90	2.60	3.90	1
6	0.90	2.40	1.80	1.20	1.80	1
7	1.05	2.80	2.10	1.40	2.10	1
20	3.00	8.00	6.00	4.00	6.00	1

8	1.20	3.20	2.40	1.60	2.40	1
36	5.40	14.40	10.80	7.20	10.80	1
57	8.55	22.80	17.10	11.40	17.10	2
24	3.60	9.60	7.20	4.80	7.20	1
47	7.05	18.80	14.10	9.40	14.10	1
10	1.50	4.00	3.00	2.00	3.00	1
23	3.45	9.20	6.90	4.60	6.90	1
1	0.15	0.40	0.30	0.20	0.30	1
3	0.45	1.20	0.90	0.60	0.90	1
66	9.90	26.40	19.80	13.20	19.80	2
46	6.90	18.40	13.80	9.20	13.80	1
9	1.35	3.60	2.70	1.80	2.70	1
60	9.00	24.00	18.00	12.00	18.00	2
30	4.50	12.00	9.00	6.00	9.00	1
28	4.20	11.20	8.40	5.60	8.40	1
61	9.15	24.40	18.30	12.20	18.30	1
44	6.60	17.60	13.20	8.80	13.20	1
53	7.95	21.20	15.90	10.60	15.90	1
38	5.70	15.20	11.40	7.60	11.40	1
22	3.30	8.80	6.60	4.40	6.60	1
50	7.50	20.00	15.00	10.00	15.00	1
40	6.00	16.00	12.00	8.00	12.00	1
64	9.60	25.60	19.20	12.80	19.20	1
51	7.65	20.40	15.30	10.20	15.30	1
65	9.75	26.00	19.50	13.00	19.50	1
49	7.35	19.60	14.70	9.80	14.70	1
56	8.40	22.40	16.80	11.20	16.80	1
55	8.25	22.00	16.50	11.00	16.50	1
54	8.10	21.60	16.20	10.80	16.20	1
62	9.30	24.80	18.60	12.40	18.60	1

Establishments > 250 employees						
	Weight 5	Weight 4	Weight 3	Weight 2	Weight 1	
	40.00%	40.00%	40.00%	40.00%	40.00%	
Unweighted Rank	5	4	3	2	1	n>=251
1	0.40	0.40	0.40	0.40	0.40	Unitil
4	1.60	1.60	1.60	1.60	1.60	BGC
2	0.80	0.80	0.80	0.80	0.80	Unitil
3	1.20	1.20	1.20	1.20	1.20	Unitil
6	2.40	2.40	2.40	2.40	2.40	Unitil
10	4.00	4.00	4.00	4.00	4.00	Unitil
5	2.00	2.00	2.00	2.00	2.00	Unitil
11	4.40	4.40	4.40	4.40	4.40	Unitil
7	2.80	2.80	2.80	2.80	2.80	Proposed
8	3.20	3.20	3.20	3.20	3.20	Proposed
12	4.80	4.80	4.80	4.80	4.80	MNG
20	8.00	8.00	8.00	8.00	8.00	Proposed
9	3.60	3.60	3.60	3.60	3.60	MNG
22	8.80	8.80	8.80	8.80	8.80	Unitil
19	7.60	7.60	7.60	7.60	7.60	BGC
21	8.40	8.40	8.40	8.40	8.40	Unitil
33	13.20	13.20	13.20	13.20	13.20	MNG
14	5.60	5.60	5.60	5.60	5.60	Unserviced
17	6.80	6.80	6.80	6.80	6.80	Serviced
39	15.60	15.60	15.60	15.60	15.60	Serviced
15	6.00	6.00	6.00	6.00	6.00	Unserviced
24	9.60	9.60	9.60	9.60	9.60	Proposed
42	16.80	16.80	16.80	16.80	16.80	Unitil
18	7.20	7.20	7.20	7.20	7.20	Serviced
16	6.40	6.40	6.40	6.40	6.40	Proposed
41	16.40	16.40	16.40	16.40	16.40	Unitil
26	10.40	10.40	10.40	10.40	10.40	Unserviced
23	9.20	9.20	9.20	9.20	9.20	Unserviced
29	11.60	11.60	11.60	11.60	11.60	Unserviced
13	5.20	5.20	5.20	5.20	5.20	Unserviced
25	10.00	10.00	10.00	10.00	10.00	Unserviced
44	17.60	17.60	17.60	17.60	17.60	Unitil
40	16.00	16.00	16.00	16.00	16.00	BGC
34	13.60	13.60	13.60	13.60	13.60	Unitil
35	14.00	14.00	14.00	14.00	14.00	Unitil
43	17.20	17.20	17.20	17.20	17.20	BGC

36	14.40	14.40	14.40	14.40	14.40	served
50	20.00	20.00	20.00	20.00	20.00	Unserviced
27	10.80	10.80	10.80	10.80	10.80	Unserviced
47	18.80	18.80	18.80	18.80	18.80	Unserviced
55	22.00	22.00	22.00	22.00	22.00	MNG
38	15.20	15.20	15.20	15.20	15.20	Served
46	18.40	18.40	18.40	18.40	18.40	Unitil
31	12.40	12.40	12.40	12.40	12.40	Unserviced
32	12.80	12.80	12.80	12.80	12.80	Unserviced
30	12.00	12.00	12.00	12.00	12.00	Unserviced
54	21.60	21.60	21.60	21.60	21.60	Proposed
37	14.80	14.80	14.80	14.80	14.80	Unserviced
28	11.20	11.20	11.20	11.20	11.20	Unserviced
49	19.60	19.60	19.60	19.60	19.60	BGC
48	19.20	19.20	19.20	19.20	19.20	Proposed
63	25.20	25.20	25.20	25.20	25.20	Unserviced
53	21.20	21.20	21.20	21.20	21.20	Unserviced
59	23.60	23.60	23.60	23.60	23.60	BGC
51	20.40	20.40	20.40	20.40	20.40	Unserviced
45	18.00	18.00	18.00	18.00	18.00	Served
57	22.80	22.80	22.80	22.80	22.80	Unserviced
52	20.80	20.80	20.80	20.80	20.80	Unserviced
65	26.00	26.00	26.00	26.00	26.00	Unserviced
58	23.20	23.20	23.20	23.20	23.20	Unserviced
66	26.40	26.40	26.40	26.40	26.40	Unserviced
56	22.40	22.40	22.40	22.40	22.40	Unserviced
62	24.80	24.80	24.80	24.80	24.80	Proposed
61	24.40	24.40	24.40	24.40	24.40	Unserviced
60	24.00	24.00	24.00	24.00	24.00	Unserviced
64	25.60	25.60	25.60	25.60	25.60	Unserviced

	Raw		Weight 1			
n>=251	Sum	Rank 0	Sum	Rank 1	Rank 1 - Raw Ranks	Sum
Serviced	43.00	1.00	9.75	2.00	1.00	6.90
Serviced	62.00	4.00	8.13	1.00	-3.00	6.85
Serviced	77.00	6.00	10.58	4.00	-2.00	9.15
Serviced	60.00	2.00	12.73	5.00	3.00	9.75
Serviced	85.00	7.00	10.48	3.00	-4.00	10.75
Serviced	61.00	3.00	13.83	7.00	4.00	12.05
Serviced	126.00	16.00	14.35	8.00	-8.00	13.05
Serviced	108.00	13.00	13.73	6.00	-7.00	13.70
Unserviced	139.00	17.00	18.93	13.00	-4.00	16.05
Unserviced	105.00	12.00	20.15	16.00	4.00	16.85
Serviced	100.00	10.00	19.90	14.00	4.00	17.15
Unserviced	72.00	5.00	16.15	9.00	4.00	16.20
Serviced	91.00	8.00	18.08	12.00	4.00	17.30
Serviced	91.00	9.00	21.95	18.00	9.00	20.05
Serviced	143.00	18.00	18.00	11.00	-7.00	19.75
Unserviced	101.00	11.00	22.43	19.00	8.00	21.20
Serviced	152.00	20.00	20.40	17.00	-3.00	22.45
Unserviced	188.00	27.00	23.53	21.00	-6.00	23.75
Unserviced	165.00	24.00	17.70	10.00	-14.00	22.85
Serviced	110.00	14.00	23.43	20.00	6.00	24.80
Unserviced	152.00	21.00	30.30	29.00	8.00	27.50
Unserviced	143.00	19.00	28.73	26.00	7.00	27.60
Serviced	119.00	15.00	26.95	23.00	8.00	27.00
Unserviced	173.00	25.00	19.90	15.00	-10.00	25.25
Unserviced	189.00	28.00	31.55	33.00	5.00	28.70
Serviced	162.00	22.00	26.88	22.00	0.00	27.50
Unserviced	221.00	39.00	33.08	37.00	-2.00	31.00
Unserviced	194.00	29.00	30.05	27.00	-2.00	30.65
Unserviced	231.00	40.00	38.08	44.00	4.00	34.65
Unserviced	242.00	42.00	33.35	38.00	-4.00	34.05
Unserviced	208.00	33.00	34.18	40.00	7.00	33.70
Serviced	211.00	34.00	32.40	36.00	2.00	33.80
Serviced	218.00	37.00	30.10	28.00	-9.00	33.55
Serviced	219.00	38.00	27.00	24.00	-14.00	32.55
Serviced	183.00	26.00	27.23	25.00	-1.00	33.05
Serviced	197.00	31.00	32.25	34.00	3.00	34.55

Unserviced	248.00	45.00	30.43	30.00	-15.00	35.20
Unserviced	164.00	23.00	37.25	42.00	19.00	37.30
Unserviced	251.00	46.00	39.78	45.00	-1.00	39.60
Unserviced	199.00	32.00	35.90	41.00	9.00	38.30
Serviced	195.00	30.00	42.78	49.00	19.00	40.80
Unserviced	264.00	52.00	32.38	35.00	-17.00	38.00
Serviced	258.00	48.00	37.33	43.00	-5.00	40.35
Unserviced	293.00	58.00	30.55	31.00	-27.00	38.55
Unserviced	286.00	56.00	31.15	32.00	-24.00	38.95
Unserviced	260.00	50.00	44.08	52.00	2.00	43.90
Unserviced	212.00	35.00	44.00	51.00	16.00	43.65
Unserviced	273.00	54.00	33.93	39.00	-15.00	41.10
Unserviced	261.00	51.00	43.18	50.00	-1.00	43.90
Unserviced	254.00	47.00	40.68	47.00	0.00	43.45
Unserviced	232.00	41.00	40.28	46.00	5.00	44.50
Unserviced	213.00	36.00	50.78	58.00	22.00	47.80
Unserviced	278.00	55.00	46.50	54.00	-1.00	47.20
Unserviced	243.00	43.00	49.05	56.00	13.00	47.75
Unserviced	291.00	57.00	44.88	53.00	-4.00	47.25
Unserviced	312.00	61.00	41.28	48.00	-13.00	46.70
Unserviced	245.00	44.00	49.20	57.00	13.00	49.80
Unserviced	304.00	60.00	47.05	55.00	-5.00	49.90
Unserviced	295.00	59.00	54.95	61.00	2.00	52.60
Unserviced	272.00	53.00	51.08	59.00	6.00	51.05
Unserviced	258.00	49.00	55.85	62.00	13.00	53.35
Unserviced	348.00	63.00	53.65	60.00	-3.00	55.90
Unserviced	326.00	62.00	56.30	63.00	1.00	57.65
Unserviced	351.00	64.00	56.93	65.00	1.00	58.20
Unserviced	359.00	65.00	56.85	64.00	-1.00	59.20
Unserviced	380.00	66.00	61.58	66.00	0.00	63.40

Weight 2		Weight 3			Weight 4	
Rank 2	Rank 2 - Raw Ranks	Sum	Rank 3	Rank 3 - Raw Ranks	Sum	Rank 4
2.00	1.00	9.70	2.00	1.00	12.43	4.00
1.00	-3.00	8.10	1.00	-3.00	8.93	1.00
3.00	-3.00	11.30	4.00	-2.00	12.40	3.00
4.00	2.00	12.80	5.00	3.00	15.73	8.00
5.00	-2.00	11.00	3.00	-4.00	10.78	2.00
6.00	3.00	13.80	6.00	3.00	15.88	9.00
7.00	-9.00	15.20	9.00	-7.00	15.70	7.00
8.00	-5.00	14.70	7.00	-6.00	14.38	5.00
9.00	-8.00	19.30	12.00	-5.00	21.38	15.00
11.00	-1.00	20.20	15.00	3.00	23.65	18.00
12.00	2.00	20.40	14.00	4.00	23.23	16.00
10.00	5.00	16.20	8.00	3.00	16.90	10.00
13.00	5.00	18.10	11.00	3.00	20.05	14.00
15.00	6.00	22.40	16.00	7.00	24.80	22.00
14.00	-4.00	18.60	10.00	-8.00	17.08	11.00
16.00	5.00	22.60	20.00	9.00	24.68	21.00
17.00	-3.00	21.50	17.00	-3.00	19.03	13.00
19.00	-8.00	24.30	23.00	-4.00	24.13	19.00
18.00	-6.00	19.10	13.00	-11.00	15.20	6.00
20.00	6.00	24.30	18.00	4.00	23.58	17.00
24.00	3.00	30.20	32.00	11.00	34.28	36.00
25.00	6.00	28.90	24.00	5.00	31.23	33.00
22.00	7.00	27.10	21.00	6.00	27.65	28.00
21.00	-4.00	21.20	19.00	-6.00	17.50	12.00
26.00	-2.00	32.10	37.00	9.00	35.35	39.00
23.00	1.00	28.00	22.00	0.00	27.00	26.00
28.00	-11.00	33.70	33.00	-6.00	35.38	40.00
27.00	-2.00	30.60	28.00	-1.00	31.10	32.00
36.00	-4.00	39.10	45.00	5.00	42.13	47.00
34.00	-8.00	34.50	44.00	2.00	35.18	37.00
32.00	-1.00	33.40	34.00	1.00	35.30	38.00
33.00	-1.00	33.50	29.00	-5.00	32.05	35.00
31.00	-6.00	31.60	27.00	-10.00	28.58	29.00
29.00	-9.00	29.10	26.00	-12.00	24.53	20.00
30.00	4.00	28.90	25.00	-1.00	25.18	23.00
35.00	4.00	33.30	30.00	-1.00	31.80	34.00

37.00	-8.00	31.30	31.00	-14.00	27.40	27.00
38.00	15.00	38.00	36.00	13.00	39.25	44.00
43.00	-3.00	40.80	49.00	3.00	42.28	48.00
40.00	8.00	36.60	35.00	3.00	35.70	41.00
45.00	15.00	43.00	43.00	13.00	45.63	51.00
39.00	-13.00	34.10	38.00	-14.00	29.50	30.00
44.00	-4.00	38.70	41.00	-7.00	36.28	42.00
41.00	-17.00	32.20	39.00	-19.00	25.78	24.00
42.00	-14.00	32.80	40.00	-16.00	26.73	25.00
50.00	0.00	45.50	57.00	7.00	47.50	54.00
48.00	13.00	44.70	48.00	13.00	46.35	52.00
46.00	-8.00	35.60	42.00	-12.00	30.48	31.00
49.00	-2.00	43.90	56.00	5.00	45.53	50.00
47.00	0.00	42.00	46.00	-1.00	40.43	46.00
51.00	10.00	41.70	47.00	6.00	39.90	45.00
56.00	20.00	50.80	51.00	15.00	54.93	60.00
53.00	-2.00	47.40	53.00	-2.00	47.53	55.00
55.00	12.00	49.40	52.00	9.00	51.73	57.00
54.00	-3.00	46.60	54.00	-3.00	45.10	49.00
52.00	-9.00	42.90	50.00	-11.00	38.93	43.00
57.00	13.00	49.80	55.00	11.00	51.25	56.00
58.00	-2.00	48.80	59.00	-1.00	47.20	53.00
60.00	1.00	56.20	61.00	2.00	58.55	64.00
59.00	6.00	51.10	58.00	5.00	52.73	58.00
61.00	12.00	55.80	60.00	11.00	59.63	65.00
62.00	-1.00	54.90	62.00	-1.00	53.98	59.00
63.00	1.00	57.70	63.00	1.00	57.95	62.00
64.00	0.00	58.00	64.00	0.00	57.98	63.00
65.00	0.00	58.60	65.00	0.00	57.73	61.00
66.00	0.00	63.30	66.00	0.00	63.05	66.00

Weight 5

Rank 4 - Raw Ranks	Sum	Rank 5	Rank 5 - Raw Ranks
3.00	5.58	1.00	0.00
-3.00	6.40	2.00	-2.00
-3.00	8.08	3.00	-3.00
6.00	8.25	4.00	2.00
-5.00	10.60	5.00	-2.00
6.00	11.15	6.00	3.00
-9.00	12.08	7.00	-9.00
-8.00	13.23	8.00	-5.00
-2.00	14.55	9.00	-8.00
6.00	15.13	10.00	-2.00
6.00	15.50	11.00	1.00
5.00	16.15	12.00	7.00
6.00	16.75	13.00	5.00
13.00	18.98	14.00	5.00
-7.00	20.45	15.00	-3.00
10.00	20.63	16.00	5.00
-7.00	22.95	17.00	-3.00
-8.00	23.30	18.00	-9.00
-18.00	24.73	19.00	-5.00
3.00	24.98	20.00	6.00
15.00	25.93	21.00	0.00
14.00	26.98	22.00	3.00
13.00	27.00	23.00	8.00
-13.00	27.08	24.00	-1.00
11.00	27.15	25.00	-3.00
4.00	27.25	26.00	4.00
1.00	29.48	27.00	-12.00
3.00	30.68	28.00	-1.00
7.00	32.45	29.00	-11.00
-5.00	33.80	30.00	-12.00
5.00	33.85	31.00	-2.00
1.00	34.15	32.00	-2.00
-8.00	34.65	33.00	-4.00
-18.00	34.80	34.00	-4.00
-3.00	34.90	35.00	9.00
3.00	35.18	36.00	5.00

-18.00	37.00	37.00	-8.00
21.00	37.25	38.00	15.00
2.00	38.83	39.00	-7.00
9.00	39.10	40.00	8.00
21.00	39.83	41.00	11.00
-22.00	40.15	42.00	-10.00
-6.00	41.35	43.00	-5.00
-34.00	41.65	44.00	-14.00
-31.00	41.95	45.00	-11.00
4.00	42.85	46.00	-4.00
17.00	43.18	47.00	12.00
-23.00	43.78	48.00	-6.00
-1.00	43.88	49.00	-2.00
-1.00	44.20	50.00	3.00
4.00	45.60	51.00	10.00
24.00	46.28	52.00	16.00
0.00	46.68	53.00	-2.00
14.00	46.90	54.00	11.00
-8.00	47.83	55.00	-2.00
-18.00	48.63	56.00	-5.00
12.00	49.70	57.00	13.00
-7.00	50.55	58.00	-2.00
5.00	50.95	59.00	0.00
5.00	51.05	60.00	7.00
16.00	51.95	61.00	12.00
-4.00	56.28	62.00	-1.00
0.00	57.73	63.00	1.00
-1.00	58.18	64.00	0.00
-4.00	59.53	65.00	0.00
0.00	63.50	66.00	0.00