THE STATE OF NEW HAMPSHIRE

BEFORE THE

PUBLIC UTILITIES COMMISSION

DG 13-086

NORTHERN UTILITIES, INC.

DIRECT TESTIMONY OF

PAUL M. NORMAND

EXHIBIT PMN-1

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I. INTRODUCTION

Q. Please state your name, address and position.

A. My name is Paul M. Normand. I am a management consultant and President of Management Applications Consulting ("MAC"), Inc., 1103 Rocky Drive, Suite 201, Reading, PA 19609.

Q. Please state your qualifications.

A. My qualifications are provided in Schedule PMN-1G-1.

II. SCOPE OF TESTIMONY

Q. What is your responsibility in connection with this proceeding?

A. I am responsible for preparing the accounting and marginal gas cost studies submitted on behalf of Northern Utilities – New Hampshire Division ("the Company"). I am also responsible for preparing the weather normalization and annualization adjustments, developing the class revenue targets, and designing rates for each of the Company's customer classes.

Q. Please outline the organization of your testimony and schedules.

A. Aside from the introductory material and this description of scope included in Sections I and II, my testimony is organized into three major sections. Section III presents a summary of my results. Section IV presents the accounting Class Cost of Service Study (COSS) and describes the methods I have employed to calculate costs by class of service, including the more significant allocation factors. In Section V, I discuss the results of my Marginal Cost Study. In the final section,

Section VI, I discuss the development of the proposed customer class revenue targets and the individual class proposed rates.

In my two cost studies, I have provided a total of ten schedules. Eight schedules address the accounting cost of service study and rate design. They are labeled using the prefix "PMN-1G-x". Two marginal cost study schedules use the "PMN-2G-x" designation. Schedule PMN-1G-1 details my qualifications and experience. The schedules relating to the COSS are labeled sequentially beginning with Schedule PMN-1G-2. Schedule PMN-1G-2 summarizes the results of my Total Company COSS. Pages 5 and 6 of this Schedule details each revenue component and reconciles to the total Company revenue requirements. The last two pages (7 and 8) present the unbundled cost of service result summaries by class of service. On page 8, column 23 shows the cost of service target revenues at the required equalized revenue requirement as shown in Schedule PMN-1G-3, page 43, line 10. This class revenue requirement detail is also provided on Schedule PMN-1G-6, pages 5 and 6, line 19. In addition to these traditional Total Company class COSS summary results, Schedule PMN-1G-3 presents the more detailed results of my COSS for the delivery function only. In this Schedule, I have removed supply-related costs to be recovered through the Cost of Gas Adjustment ("CGA") Clause. Schedule PMN-1G-4 shows a similar level of cost detail by customer class as Schedule PMN-1G-3, but for only the supply-related costs (Production) instead of the delivery-related cost function (Schedule PMN-1G-3). Schedule PMN-1G-5 presents a similar level of cost detail as Schedules PMN-1G-3 and PMN-1G-4 for the total unbundled costs

for the supply and delivery functions instead of by rate class as shown on the horizontal. This Schedule also identifies CGA direct Gas Costs and CGA Bad Debt costs included in the supply function as summarized in Schedule PMN-1G-2. Schedule PMN-1G-6 presents a detailed functional unbundled summary of the costs to serve for each rate class at both present and equalized rates of return (ROR). Schedule PMN-1G-7 contains a detailed description of the allocation factors, both externally developed and those developed internal to the COSS to provide a complete reference and understanding of the allocation methods employed in my study.

Schedule PMN-1G-8 presents the details of the proposed rate design calculations along with the summaries from all of the COSS results discussed earlier (Schedule PMN-1G-3 and Schedule PMN-1G-6).

The marginal cost study consists of two schedules: Schedule PMN-2G-1, presents a detailed discussion of the marginal cost study, and Schedule PMN-2G-2, which consists of 14 separate tables, presents the detailed calculations as described in Schedule PMN-2G-1. These 14 tables show all of the significant calculations underlying the development of marginal costs.

In order to facilitate a thorough review of my cost studies, I have included a complete set of workpapers with this filing, labeled as “Gas Accounting Cost of Service @ 12/31/12 Workpapers” and “Gas Marginal COS @ 12/31/12 Workpapers.”

III. SUMMARY OF RESULTS

Q. Could you please summarize your results and rate design proposals?

A. My studies and proposed rate design results are as follows:

1. Marginal cost of service results by class indicate very large revenue deficiencies for Residential classes (PMN-1G-8, pages 2 and 7 of 8) when compared to existing revenues (PMN-1G-8, page 2 of 8).
2. Distribution fixed costs are the majority of the Company's costs (PMN-1G-8, page 7 of 8).
3. Emphasized increasing the monthly fixed costs to improve pricing efficiency (PMN-1G-8, page 4 of 8).
4. Established initial class revenue targets by increasing each class by the same 23.34% as the system overall to temper the effects of fixed cost recovery.
5. In proposing increased fixed cost recovery, I also proposed a corresponding reduction of existing block differentials (PMN-1G-8, page 5 of 8) for classes.
6. The proposed rate design is more efficient by reflecting pricing levels that are closer to the marginal cost to serve each class. However, revenue recovery results continue to show some subsidy among the classes (PMN-1G-8, page 3 of 8).

IV. ACCOUNTING COST OF SERVICE STUDY

Weather Normalization

Q. What is the purpose of a weather normalization adjustment?

A. For the purposes of rate making, the test year must represent typical or normal circumstances. The Testimony of David L. Chong has identified specific adjustments to the test year to reflect the expenses that normally would be anticipated in the test year. I have provided him with one of those adjustments to reflect the costs and revenues that could be expected under normal weather conditions. The Company's sales are weather sensitive. Even small variations in weather can have a material impact on the sales and revenues of the Company. The weather normalization adjustment is targeted to identify the change in sales and revenues that would have been anticipated if the actual weather in the test year had been exactly normal.

Q. How do you define normal weather?

A. In order to properly account for the year to year variations in effective degree days, normal weather is defined as the average annual effective degree days over the last 30 years. The Company has provided historical daily effective weather data. The daily normal effective degree day data provided was the most recent 30-year average as of January 2013.

Q. Please explain what you mean by "effective degree days"?

A. Effective degree days are a refinement upon heating degree days, the temperature departure from 65 degrees Fahrenheit. Effective degree days incorporate a small

adjustment to heating degree days to reflect the impact of wind speed. Previous studies have shown that effective degree days are more highly correlated to gas sales than conventional degree days. As a result, the Company has been employing effective degree days as its primary weather measurement for many years.

Q. Please describe your weather normalization calculations.

A. I have summarized the weather normalization calculations in the filed Workpapers which also show the monthly per-books sales data for 2012. The Workpapers show the derivation of the billing cycle degree days including actual and 30-year normal effective degree days by calendar month. Since monthly customer billing data are recorded on a billing cycle basis, the actual sales data incorporate some lag due to meter reading and billing. I computed weighted average actual and normal degree days for each billing cycle within each month. This process was repeated for each of the sales and transportation customer classes.

Q. Could you describe the actual weather normalization calculations?

A. Yes, base load is computed as the average use per customer in the months of July and August. Monthly loads above this level are considered "Heating Loads". I made a minor adjustment to this calculation in those cases where the months' Billing Cycle Sales were below the July and August average. If the sales were below the July and August average, I did not weather normalize those months because they did not show any sensitivity to weather. Monthly sensitivity to

degree day variations is computed by dividing the month's heating load by the actual billing cycle degree days to derive the actual unit heating load per degree day. This figure was then multiplied by the temperature departure from normal to develop a weather adjustment. In some months, actual weather was warmer than normal while in others it was colder. In total, the year was warmer than normal, resulting in a positive weather adjustment to sales.

Q. How did you derive the net revenue adjustment for each class?

A. Starting on page 83 of the Workpapers, the CCF (one hundred cubic feet) values shown in the column labeled "Weather Adjustment" on this schedule represent the monthly adjustments due to the variation from normal weather (30-year average). The volumetric weather adjustment was multiplied by the variable rate block component of the present tariffs based on the calculated monthly average use level to derive the revenue impact as shown on the right-most column of these pages. Page 99 of the Workpapers presents the weather normalized billing month sales under present rates. Page 100 of the Workpapers shows the adjustment to base revenues from actual to normal weather conditions.

Annualization Adjustment

Q. What is the purpose of the annualization adjustment?

A. The annualization adjustment reflects test year revenue levels at current approved rates for the 12 months ended 12/31/12. Two different rate levels were applicable to bill the revenues during calendar year 2012: the January 1, 2012 temporary rates and the May 1, 2012 permanent rates. The annualization adjustment reflects the change in revenue levels if the billing determinants for the 12 months were billed at the current rate levels, i.e. the rates that went into effect on May 1, 2012 for permanent rates.

Billing Determinants

Q. Could you describe your efforts in developing the billing units for the rate design?

A. The development of billing units was straight forward. I developed the number of customers, calendar month sales, and weather adjusted sales for each class segregated between sales and transportation service. The Company's rate classes are:

Rate Designation	Description
R-6 & R-11	Residential Non-Heating and Low Income
R-5 & R-10	Residential Heating and Low Income
G-40 & T-40	Small General, High Winter Use
G-50 & T-50	Small General, Low Winter Use
G-41 & T-41	Medium General, High Winter Use
G-51 & T-51	Medium General, Low Winter Use
G-42 & T-42	Large General, High Winter Use
G-52 & T-52	Large General, Low Winter Use

Q. Have you presented calendar month sales information by rate class?

A. Yes. In order to develop allocation factors for the COSS, I adjusted billing cycle sales data to restate them on a calendar month basis. This calculation employed the same billing cycle lag factors by billing cycle and rate class used to develop billing month degree days resulting in the calendar month data in the Workpapers, page 109, at the sendout level which includes an adjustment for losses.

Accounting Cost of Service Study

Q. Would you briefly define an Allocated Cost of Service Study or COSS?

A. The cost to serve the customers of any utility company consists generally of operating expenses, return on investment, and related taxes. For a historical test period, these costs are recorded on the books and records of the Company, and the overall cost to serve the collective customers of the utility can be readily established. On the other hand, the specific cost to serve customers in the various service classifications is much less apparent. Costs can vary significantly between customer classes depending upon the nature of their demands upon the system and the facilities required to serve them. The purpose of a COSS is to assign or allocate each relevant component of Northern's overall costs of service on an appropriate basis in order to determine the proper cost to serve the Company's respective classes. The result is a cost matrix displaying, for each cost category, the detailed costs of serving each customer class.

Q. Please describe the procedure that you used in preparing your COSS?

A. Through the application of a cost model developed by MAC specifically for the Company's gas operations, it was possible to address each element of rate base, revenue and operating expense in detail and to assign or allocate each element to customer classes. This process is summarized in Schedule PMN-1G-2, page 1, and this Schedule mirrors Northern's total Company costs to serve as presented in the Testimony of David L. Chong and summarized in my revenue reconciliation, Schedule PMN-1G-2, page 5.

Description of Cost Model

Q. How does the MAC cost model operate?

A. The cost model is essentially a matrix. The vertical dimension of the study consists of the detailed costs to serve as provided by the Company. The development of the cost of service study begins with rate base and continues with revenues, operating expenses, taxes, and the computation of a labor allocator. The cost model includes three additional reports: a summary of costs to serve, a list of the allocation factors employed in the study, and a revenue requirements section.

The horizontal dimension of the study consists of either customer classes or cost functions. Since the customer classes cannot all fit on a single page, two sub-pages are required to list all customer classes.

Each page, starting with page 1, has a column immediately preceding the numerical data marked "ALLOC," an abbreviation for ALLOCATOR. The

ALLOC column contains an acronym to indicate the allocation factor used to allocate the costs shown in the Total Company column to individual customer classes. A tabulation of these allocators, typically total dollars or volumes, and as a percent of total has been provided at the end of each study beginning on page 45 of Schedules PMN-1G-3 and PMN-1G-4. In addition to a simple tabulation, these allocation factors are further presented as a unitized ratio of Total Company beginning on page 61 of Schedules PMN-1G-3 and 1G-4. Schedule PMN-1G-7 further describes each of these allocators.

Using these allocation factors, costs shown in the Total Company column are assigned to each customer class or function shown on the horizontal of the cost study. The cost of service information provided in the vertical column can be of two forms: either per-books numbers as reported for the test year or pro forma adjustments, to reflect the adjustments as identified in Mr. Chong's schedules.

Cost of Service Model Allocation Methodology

Q. How did you choose allocation factors for your cost study?

A. Generally speaking, I use a hierarchal approach to assign costs to customer classes, choosing the highest level available to assign or allocate cost elements in the cost study. The first or highest level is to identify a direct relationship between the cost under study and the individual classes. For example, present revenue is booked by customer class, so in the cost study, I directly assign these present revenues after adjustment for weather and annualization (reference workpapers) to customer classes. The second level in the hierarchy employs the

results of special studies. When costs cannot be directly assigned to a specific class, a special study can be undertaken to replicate the intended use of specific plant investments or expenses and then assign costs based on the specific use of these assets in the test year. For example, services and meter investments required special analyses which are detailed in the Workpapers. The next level in the hierarchy employs an external allocator to serve as a basis for cost assignment. For example, the cost of processing a computer generated bill is the same for all classes. An external allocator representing the number of bills produced for each customer class in the test year was developed to allocate these costs. The final alternative, using an internal allocator for cost assignment, involves selecting some combination of cost elements previously allocated in the cost study to assign certain remaining costs appropriately to customer classes. An internal allocator is a relationship computed from combining more than one cost already allocated in the cost study. As an example, property taxes are assessed by individual taxing authorities based primarily on the plant in service within their jurisdictions. In order to allocate property taxes, I develop an internal allocator for the total of all plant. In this case, total **PLANT** is an internal allocator composed of the sum of each individual item of plant in service, each of which has been previously allocated to customer classes on some rational basis. Using this costing approach, I assigned each rate base operating expense item to customer classes.

Rate Base Allocation

Q. Please describe the allocation of rate base to customer classes.

A. Rate-base allocations are shown on pages 2 through 7 of Schedules PMN-1G-3 and PMN-1G-4. Plant is shown sequentially at the 3-digit Uniform System of Accounts level. The Company's intangible plant were the first items allocated, followed by production plant investment. Since intangible plant could not be assigned to classes using any of the first three levels in the hierarchy of allocation methods, intangible plant was assigned on an internally developed allocator, total labor.

Production plant is primarily assigned using a Design Day remaining allocation factor. This is based on adjusting (reducing) the total Design Day demand lower by removing a base use component (two-month average) for each rate class. This approach more properly matches these incremental costs with their associated usage potential.

Next, distribution capacity-related plant was assigned to classes on the basis of allocation factors **DISTR** and **DISTRMAINS.** The **DISTR** allocation factor was developed externally and is used for the allocation of distribution plant capacity-related costs such as structures and improvements, compressor station equipment, and measuring and regulating station equipment. The **DISTRMAINS** allocation factor is used for the allocation of rights of way and mains. Both allocators, **DISTR** and **DISTRMAINS**, are based on the Proportional Responsibility method, whereby the normalized monthly system loads carried by the distribution

system are weighted so that costs are assigned to classes based on the variation of sales level from peak to off-peak months.

Q. Please describe briefly the Proportional Responsibility method?

A. This method, often abbreviated as the "PR" method, has a long history of acceptance as an appropriate distribution capacity allocator for gas distribution utilities in New Hampshire and other states.

The PR method uses monthly normalized system throughput whereby the calculation recognizes the monthly sendout levels for the test year and calculates a weighting for each month. The resulting monthly ratios are then allocated to each customer class use for that month and then summed to arrive at a final composite allocation by class for the test year. A more complete discussion with our example and calculations has been provided in the accounting cost study Workpapers.

Q. Please describe your summary results of the PR allocation procedure.

A. The PR procedure essentially results in an overall weighting of 87.3% to the winter period and a complementary 12.7% to the summer period as shown in the Workpapers. The winter period consists of the months of November through April, with the remaining months being included in the summer period.

Q. What are the customer-related plant allocation factors included in your cost study?

A. Customer-related distribution plant items were allocated using **CUST**-prefixed allocators for services, meters, and other such customer-related items. These

factors, taken from the Company's continuing property records, general accounting records, and any other available sources, serve to allocate the specific customer-related costs incurred for each customer class.

The allocation of Services (Account 380) was based on current installed-cost-per-customer class using historical Company data with recognition of the total number of services in arriving at the final number of services per class. Similarly, the allocation of Meters (Account 381) was developed by identifying the typical replacement cost new for meters used to serve customers in each rate class. The supporting details have been provided in the Accounting Workpapers.

A list of the direct customer-related allocation factors is presented on pages 49 and 50 of Schedules PMN-1G-3 and PMN-1G-4 of the cost of service studies with a description and explanation of each also presented in Schedule PMN-1G-7.

Q. How were the general and common plant items allocated on pages 5 and 6 of Schedules PMN-1-G-3 and PMN-1G-4?

A. The general plant items, excluding the METSCAN and ITRON communication equipment (Account 397), were allocated on an internally developed labor allocation factor (**LABOR**) and a Distribution Plant allocator (**DISTRPLT**) for the Distribution-related items. The labor allocator is based on labor expensed and capitalized for each account in the test year. The labor portion of each Operation and Maintenance function was identified and allocated separately in the same manner as the corresponding total expense accounts were allocated. Similarly, capitalized labor costs were assigned to classes on the same basis as the plant

function. The allocated labor costs were then subtotaled by class to arrive at the composite allocation factor, **LABOR**. The detailed development of this allocator is presented on pages 37 through 42 of Schedules PMN-1G-3 and PMN-1G-4 of the cost of service studies.

The METSCAN and ITRON communication equipment items (Account 397) were allocated on CUST397M and CUST397I respectively. CUST397M was developed using the number of METSCAN meters in service by rate class (excludes Residential) and CUST397I was developed using the number of ITRON meters in service by rate class.

Q. How was each account of reserves for depreciation allocated?

A. Each account of reserves was allocated on the subtotal of the corresponding allocated costs of its respective plant item.

Q. What other elements of rate base were included in your study?

A. Additions to net plant included materials and supplies and an allowance for cash working capital. The deductions from net plant were customer deposits, customer advances, and a reserve for deferred federal income taxes. Each item was allocated on the most appropriate allocation factor. Customer Deposits were directly assigned to rate classes. (See Workpapers page 352 through 354.)

Operating Revenue Allocations

Q. Could you discuss the allocation of operating revenues?

A. Revenue details are shown on pages 15 and 59 of my cost studies in Schedules PMN-1G-3 and PMN-1G-4. The actual and weather normalized CCF sales and

revenues for each firm rate class are detailed in the filed Workpapers. Revenues associated with special contracts were included and allocated to all firm classes on the distribution plant allocator **DISTR**.

Late payment charges represent charges for paying bills beyond their normally scheduled due date. The Company provided an assignment of these charges by customer class for use in the cost of service study. (See filed Workpapers pages 352 and 353 for details.)

Operating Expense Allocation

Q. How were operating and maintenance expenses allocated?

A. The allocation of O&M expenses follows the method by which these expenses were incurred. Therefore, the plant-related capacity expenses are allocated using the same allocators used for their associated plant investment.

Q. How were the gas costs assigned?

A. The direct gas costs were assigned to rate classes based on the revenues billed during the test year, which are based on the Company's Simplified Market Based Allocation ("SMBA"). The gas revenues and direct gas costs exactly offset by rate class. The O&M costs associated with Propane (LPG) and Liquefied Natural Gas (LNG) were allocated on the DEMLPG and DEMLNG factors, which are each based on a Design Day remaining calculation, as previously discussed, with plant costs. The details relating to these expenses are developed in Schedules PMN-1G-4 and PMN-1-G-5. A summary of these functional revenue requirements is presented on Schedule PMN-1G-2, page 7 of 8.

Q. How were the remaining operation and maintenance expenses allocated?

A. Distribution O&M expenses follow the corresponding allocation of distribution plant. Customer Accounts, Sales Expenses, and Administrative and General Expenses were allocated using a variety of methods based on direct assignments, revenues, sales, gas costs, number of bills and number of customers. Whenever possible, specific information detailing class cost responsibilities was utilized in order to develop the most accurate cost study possible. A&G expenses are allocated partly on labor, revenue requirements, gas costs and plant in service, all developed internally.

Schedule PMN-1G-7 contains a complete description of each allocator utilized in the cost of service study.

Q. What are the remaining operating expenses?

A. The remaining operating expenses consist of depreciation and amortization expenses, taxes other than income taxes, interest on customer deposits, state income taxes, and federal income taxes.

Q. How were they allocated?

A. Depreciation and amortization expenses were allocated on the basis of plant in service similar to the allocation of depreciation reserves. Taxes Other Than Income Taxes that are plant-related were allocated on **PLANT,** and those that are labor-related were allocated on the **LABOR** allocator discussed earlier. Interest on Customer Deposits was allocated on customer deposits (CUSTDEP). Federal

income taxes and state franchise taxes were computed for each customer class based on their individual revenues less allocated expenses.

Q. Could you summarize the results of your overall Schedule PMN-1G-2 cost of service study at present class revenue levels?

A. The results of this study demonstrate that the rates presently in effect generate very different rates of return for each customer class (reference lines 21 and 22 of page 1). As Schedule PMN-1G-2 demonstrates, the Company's current rates produce large inequities between major rate classes.

Unbundled Costs to Serve

Q. How does your COSS relate to the development of unbundled cost to serve the gas supply and transportation functions?

A. My COSS addresses cost to serve as a three dimensional array. So far, I have discussed only two dimensions, the accounting cost dimension, showing the details of the rate base and expense items, which determine total cost to serve and the second dimension, the class dimension, showing how each of these costs is allocated to customer classes.

In order to provide unbundling cost details and provide a useful guide to delivery rate design efforts, the COSS must also identify costs by major functions such as Supply and Delivery. Allocations to the class and function dimensions are performed automatically and simultaneously within the COSS model. For example, the allocation of metering investment was determined to be related to the distribution function alone and not to the gas supply function. The meter

allocator was defined as 100% distribution customer-related and at the same time these costs were allocated to individual customer classes. Although many of the allocators used in the COSS were assigned directly to one function or another, other allocators were developed internally in the cost study as composites of other allocated costs and result in allocations to more than one functional cost category. This sub-detail is simply a matrix of cost recognition throughout the allocation process for each identified cost element.

Q. Have you prepared any unbundling functional cost of service studies as part of your efforts to analyze the Company's overall costs?

A. Yes, I have. Following the standard cost allocation procedures outlined earlier in my testimony, I have aggregated costs and prepared complete unbundled functional cost of service results for the Delivery (Schedule PMN-1G-3) and Supply (Schedule PMN-1G-4) functions.

The completed functional cost study results, Schedule PMN-1G-5, shows the allocation of each item contributing to revenue requirements, summarized into the Production and Delivery cost functions. The allocation factors used to develop this study are listed, beginning on page 23 of the functional cost of service study. Please note that Schedule PMN-1G-5 is also the exact result for the total columns only from the class Delivery and Supply unbundled studies, Schedules PMN-1G-3 and PMN-1G-4 for class cost study details. The functional revenue requirements from Schedule PMN-1G-5, page 22, line 10, are further detailed by cost function and class of service in Schedule PMN-1G-2, pages 7 and 8.

Q. How do you determine the gas supply and delivery-related costs from the unbundled cost of service study results you have presented?

A. The fixed delivery cost components to serve consists solely of the distribution capacity, customer costs, and Base Uncollectible Costs, as shown on Schedule PMN-1G-3, Delivery only cost of service. The remaining costs, shown on Schedule PMN-1G-4, are gas-supply related. The gas revenues and associated gas costs presented in the cost of service studies are based on actual results from the Company's test year data.

Q. How do the delivery revenue requirements compare to existing base rates when embedded gas costs are removed?

A. Existing base rates were previously unbundled to include only distribution costs and exclude production-related costs. Therefore, the costs shown on Schedule PMN-1G-3 are directly comparable to the proposed revenues produced by base rates. These same summary results are also presented in the more detailed class unbundled cost summary results, Schedule PMN-1G-6 (line 19). Please note that Schedule PMN-1G-6 contains results at both the existing ROR (pages 1 through 4) and the proposed (pages 5 through 8) equalized ROR. A complete revenue reconciliation showing each cost component has also been provided in Schedule PMN-1G-2, pages 5 through 8.

Q. What are the indicated results from your unbundled class accounting cost study presented in Schedule PMN-1-G-6?

A. The unbundled class cost results from this study detail clearly show that the Distribution delivery costs to serve Northern's customers are essentially fixed in nature and are either capacity or customer related. These results indicate that the cost recovery and pricing should strongly emphasize fixed monthly charges, especially for smaller customers where fixed investments are necessary regardless of total consumption. Any proposed fixed monthly charges should therefore reflect a consideration for both a monthly customer charge and a separate fixed monthly facility charge.

Q. Are you saying that the majority of a Distribution Company's costs are fixed?

A. Yes, that is exactly what I am saying. Distribution capacity investments have little to do with variable consumption and are much more directly related to maximum daily (hourly) consumption. I emphasize this as the major underlying cost driver for investments in distribution facilities. For gas utilities, usage levels are six to ten times higher in winter months when compared to summer months.

Q. Have you broken down your calculated costs into additional levels of fixed costs?

A. Yes, I have. As I just mentioned, the two major Distribution fixed costs components are customer related (services and meters) which are closest to the customer and capacity or demand related which are connecting the customers'

delivery requirements to the Company's distribution facilities all the way back through mains, regulatory stations, and gate stations. I have identified, a portion of these capacity costs to represent a backbone level of facilities required to provide local service to customers.

Q. Have you identified any of these fixed costs in preparing your unbundling costs results mentioned earlier?

A. In order to more properly reflect the next "slice" of the delivery system closest to the customer that is truly fixed in nature and should also be recovered with a monthly charge similar to a customer charge approach, I identified a skeletal or backbone system that is basic to all customers which should, as a minimum, be recovered in a fixed monthly charge which I am calling a facility charge.

Q. How did you segregate the costs responsibility associated with your backbone system?

A. As I mentioned earlier, the majority of all costs are fixed for a distribution utility. In order to further separate a portion of the remaining noncustomer-related fixed costs, I reviewed the Company's plant Distribution history and discussed current planning standards with respect to Mains (Account 376). I concluded that the smaller diameter, up to 2" diameter mains are primarily used to provide local service. I have included the summary details in the filed Workpapers with the following summary results:

Pipe Size	Footage	%	$	%
Equal to or less than 2"	980,114	34.6	17,310,001	24.4
Total	2,834,743	100.0	70,934,086	100.0

Q. How did you apply these factors in your calculations?

A. In identifying a backbone system for mains, I identified 24.4% of the mains investment as being related to the backbone distribution system that should be recovered in a fixed monthly charge similar to the customer charge results. I then segregated the mains unbundled revenue requirement costs into a Facility Charge component with the remaining costs left as capacity related. The details supporting these calculations are shown in the rate design, Schedule PMN-8, page 7, and the filed Workpapers Local Distribution Fixed Facility Charge Factor, page 366.

Q. Does the cost of service study provide additional information needed to update the Company's CGF?

A. Yes. The cost study presented in Schedule PMN-1G-4 segregates Indirect Gas Supply Costs from delivery revenue requirements to aid in the updating of the Cost of Gas Factor (CGF). Since these Indirect Gas Supply Costs are associated with providing Supply service, it is important to update these costs to incorporate into the CGF (reference Schedule PMN-1G-2, pages 7 of 8).

First, the study identifies the costs associated with the owning and operating of the Company's manufactured gas facilities. For the most part, these LP- and LNG-related costs are incurred to provide gas supplies on extremely cold days. Consequently, the LP and LNG costs were assigned to the Supply function.

The second item addresses operations and maintenance expenses associated with the gas acquisition and gas dispatching costs, including any associated legal

expenses. The gas dispatching, gas acquisition and legal costs are booked in Accounts 813, 851, 923, and 928. The operations and maintenance expenses associated with gas supply must be unbundled from the transportation rates. Consequently, my cost study explicitly removes these supply-related costs from the delivery revenue requirement and assigns them to gas supply function. A detailed derivation of these costs is also contained in the filed Workpapers.

The third item concerns overhead costs such as general plant and administrative and general expenses. Although the majority of these costs are associated with the delivery function, it is obvious that a portion of these costs must be gas supply-related as well. I have automatically assigned a portion of general plant and administrative and general expenses to the gas supply function through the allocation process by the selection of internally developed allocators. As an example, the labor allocator includes the labor associated with LP and LNG plant operations and maintenance expenses, which are primarily gas supply-related costs. Consequently, the overheads allocated on the basis of labor will properly include an assignment of these costs to the gas supply function. Schedule PMN-1G-2, pages 7 and 8, presents the class summary revenue requirements completely unbundled.

V. MARGINAL COST OF SERVICE STUDY

Overview of Marginal Cost Study

Q. Please summarize the objectives of a marginal cost study.

A. The marginal cost study is provided in Schedules PMN-2G-1 and PMN-2G-2. Schedule PMN-2G-1 presents a detailed discussion of each of the calculations presented on the 14 tables of Schedule PMN-2G-2.

A marginal cost study provides an estimate of the cost of providing an additional unit of service in the long run. These cost estimates are then applied to appropriate usage characteristics to derive class revenue requirements which can be utilized as a benchmark or reference in setting proposed rates to the extent allowed by considerations of intra-class equity and efficient pricing. The use of marginal costs pricing in ratemaking tends to result in prices that best promote economically rational consumption decisions, and thereby promotes an efficient allocation of society's resources. Sending customers accurate price signals regarding the costs that will result from their consumption decisions furthers this efficiency goal. Customers, in turn, will be able to make informed decisions on their use of utility services.

Q. How is a marginal cost study used in the rate design process?

A. The Northern Utilities New Hampshire Marginal Cost Study (NUMCS) establishes marginal revenue levels and prices for each rate class on the basis of marginal costs, adjusted using the Equi-Proportional Method (EPM) to recover the allowed total Distribution Delivery revenue requirements requested by the

Company as shown on Schedule PMN-2G-2, Table 14. The proposed total system and class Delivery service revenue requirements are established at the adjusted test year Distribution revenue levels. Delivery service marginal costs by class (which differ from the revenue requirement) are then adjusted to equal the delivery system total revenue requirement (Schedule PMN-1G-2, page 5 of 7, line 12) on a pro-rata basis using the EPM. This calculation is made on Schedule PMN-2G-2, Table 14. The resulting scaled marginal costs by class and cost component then become the theoretical initial revenue targets for the design of Delivery service rates. These results are presented as a final comparison in the rate design process on Schedule PMN-1G-8, page 7 of 8.

Q. Please summarize the different elements of a typical marginal cost study.

A. A typical marginal cost estimate contains several components. The marginal commodity cost component is intended to reflect the short run variable cost of varying the Company's level of gas sendout by one unit, assuming the Company's production capacity is held constant. The short run marginal cost is, therefore, the cost of gas (plus indirect costs). The marginal production capacity cost component is intended to reflect the long-run cost, on a unitized basis, of expanding the Company's production facilities to meet an increase in customers' requirements for gas service. The marginal transmission and distribution component is intended to reflect the unitized cost, based on historical data and recent trends, of expanding the local distribution network to accommodate growth in the number of customers and their demand requirements.

Q. Could you provide an overview of the methodology you employed?

A. Yes. I have computed Distribution marginal costs to serve each of the Company's existing New Hampshire rate classes based on test year costs. I have used regression and engineering techniques to estimate the hypothetical distribution costs of serving an increment of customer load, including the unit costs of adding distribution plant facilities as well as the additional costs for O&M. These distribution fixed capacity costs were measured in dollars per design day ccfs. I have used engineering estimates to identify the investment in services and meters and added O&M expenses necessary to serve a new customer. From these factors, I have developed the annual revenue requirements to serve each of Northern Utilities' New Hampshire firm rate classes. These costs are stated in terms of customer and volumetric and facilities charges. The methods I employed in the marginal cost study are discussed and described in Schedule PMN-2G-1.

Q. What were the results of the marginal cost study?

A. Schedule PMN-2G-2, Table 12, tabulates the long-run marginal costs to serve each customer class. In addition, the table on this page calculates the revenues that would be generated if the Company were to introduce full marginal cost-based pricing and if customers were to continue to consume as they have in the past. Schedule PMN-2G-2, Table 13, provides marginal costs on a unit cost basis. Finally, Schedule PMN-2G-2, Table 14, presents the EPM adjustment to restate marginal costs at a level that match the total delivery service revenue requirements (Schedule PMN-1G-2) as discussed earlier in my direct testimony.

Q. Have you developed a Local Distribution Facility Charge Factor similar to what was proposed for the COSS discussed earlier in your testimony?

A. Yes, I have. Marginal costs to serve include two types of cost – costs that vary with the number of customers and costs that vary with the design day demands of customers. In essence, the utility must construct a distribution system capable of handling the anticipated loads of customers under extreme weather conditions. These costs are incurred regardless of the actual weather occurring in the test period and are also independent of the volumes consumed by customers throughout the test year. Therefore, it is more appropriate to recover these costs through a demand charge, or in the absence of demand data, a fixed monthly charge rather than a volumetric charge.

The factor that I utilized for local distribution costs was the same as the accounting study and applied to growth-related investments. (See Workpapers – Accounting – Local Distribution Facility Charge.) This factor was then applied to the fixed marginal capacity cost on the rate design Schedule PMN-1G-8, page 7, column L.

VI. RATE DESIGN

Q. Your cost studies provide a wealth of information. Could you highlight the most relevant cost data that will be considered in the overall rate design process?

A. Yes, these can be reviewed as follows:

Schedule	Description	Page
PMN-1G-2	Class ROR Results	1 & 2
	Existing Revenue Requirements and Equalized ROR	3 & 4
	Revenue Reconciliation Details	5 & 6
	Unbundled Class Revenue Requirements	7 & 8
PMN-1G-3	Delivery Class Cost of Service Study	
PMN-1G-6	Unbundled Class Cost of Service	
	– Existing Rate of Return	1 to 4
	– Uniform Rate of Return	5 to 8
PMN-1G-8	Rate Design Summary and Calculations	
PMN-2G-2	Marginal Cost – Table 14	

The above schedules provide all of the detail required to design rates to produce the overall class revenue requirements for delivery of $26,009,836 based on an equalized 8.54% ROR. This represents a $4,953,422 increase on existing base Delivery revenues of $21,056,414 (Schedule PMN-1G-2, page 5 of 7).

Revenue Targets

Q. How have you determined the target class revenue requirements you are proposing in the rate designs?

A. Normally, I would develop class revenue targets as a discrete step in the rate design process. The step following revenue targets would normally be specific class rate designs. The overall class rate design calculations are presented on Schedule PMN-1G-8. My initial derivation of class revenue targets was based on the goal of setting all customer class revenue requirement levels at the adjusted marginal levels as shown on Schedule PMN-1G-8, page 2 of 8, columns (S) through (V). My initial derivation is based on NH history. Unfortunately, this approach would result in some very large increases to existing Residential revenue levels and, thus, to existing Residential customers. Before proceeding, I

carefully examined the relationship between existing rates by function and the functional costs to serve from my studies. I noticed that the present rates have extremely low customer charges when compared to the costs developed in my two cost studies. I then determined that my first goal was to set proposed rates closer to cost of service. In order to accomplish this, I would have to moderate the residential total revenue increase to a lower level that has been traditionally used based on cap limitations. It became obvious that rate stability and customer impacts consideration alone would prevent any meaningful consideration toward cost to serve. In other words, rather than continue the historical trend of setting customer charges at a fraction of fixed costs, I am proposing that rates be less volumetric and more fixed, balanced (offset) by initially using a uniform class percentage increase to all instead of proposing a higher rate cap approach.

Schedule PMN-1G-8 contains eight pages of detail calculations as follows:

Page	Description
1	Class Summary of Billing Units and Blocking Levels
2	Summary of Cost of Service Results and Derivation of Class Revenue Targets (Schedule PMN-1G-2, pages 1-2, and Schedule PMN-1G-3, pages 43-44)
3	Summary of the Proposed Increases by Customer Class (Column AB-uniform) with a Rate of Return Comparison at Existing (Column AD) and Proposed Revenue Levels (Column AC)
4	Summary of Existing Charges and Proposed Fixed Customer Charges, Existing Block Pricing Levels, and Differentials
5	Summary of Proposed Seasonal Block Charges, Percent Increases over Existing Levels and Proposed Block Differential Compared to Existing
6	Final Proposed Revenue Recovery by Rate Component for Each Rate Class (column (x) shows the fixed customer revenue levels from the cost of service at a uniform ROR compared to the actual recovery of these fixed costs based on the proposed customer charges in column (y))
7	Summary Results of Accounting and Marginal Cost of Service Studies

(Revenue Requirements (Schedule PMN-1G-8, page 7 of 8) from Schedules PMN-1G-3, PMN-1G-6, and Schedule PMN-2G-2, Table 14

8 Summaries of the Proposed Rates and Block Differential Targets used to Establish the Proposed G-51 and T-51 Charges

Q. How did you establish your class revenue targets?

A. I reviewed all aspects of both cost of service studies and their results as summarized on Schedule PMN-1G-8, page 7 of 8. Next, I utilized the results of the class marginal cost of service study as my starting point as shown on page 2 of this Schedule. I limited or capped residential and low annual (G-40/T-40) as my starting point since it was the major deficiency category. Note that both studies present final results that are reasonably supportive of each other for the smaller classes which ensures that the proposed revenue targets and rate levels are properly priced. Both cost studies also emphasize a major increase in fixed cost recovery and a corresponding decrease in fixed costs recovery through the volumetric charges.

The most straightforward and simple approach to recover these fixed distribution costs is by applying an increase in the fixed monthly charge. In adopting this pricing approach to the proposed rate design, I also recognized that the revenue increase impact must be moderated to temper the level of increase to a customer class. Traditionally, residential customers have shown an extremely lower rate of return when compared to commercial and industrial customers or to the system average rate of return. In other words, residential customers, and especially the non-heating residential, were being significantly subsidized by larger users. In order to properly incorporate a tempered class revenue target goal which would

have otherwise been at a 28.13% increase to residential using a traditional 115% cap, I instead established a lower initial revenue target goal equal to the overall system 23.34% increase for all classes (Schedule PMN-1-G8, page 2). With this approach, a more meaningful emphasis can be proposed for the fixed costs recovery through monthly customer charges.

Q. Are the current rates cost based?

A. No they are not. Both the marginal and accounting cost studies show that the majority of the costs are fixed and should therefore be recovered through a monthly charge. In fact, only a very small portion (less than 1/3) of these costs are currently being recovered as fixed monthly charges (Schedule PMN-1G-8, pages 2 and 8). Unfortunately, the majority of these fixed costs are being recovered in the existing volumetric rates. The biggest level of this under recovery rests with the smaller residential customers where the majority of fixed costs are recovered in volumetric charges.

Q. Do the current rate structures reflect fair and equitable rates?

A. No, they do not. The existing rates are not very efficient or equitable and instead promote large intra and inter class subsidies. As I stated before, the majority of the Company's distribution costs are fixed and any proposed rate design object must emphasize fixed cost recovery through higher monthly charges. This is the only approach that will truly reflect the cost of providing distribution service to customers.

Whether analyzing marginal or accounting cost analyses, there are only two types of costs: cost that vary with the number of customers (meters and services) and costs that vary with the design day demand of customers. The gas distribution utility must be able to handle (deliver) anticipated loads to all customers under extreme weather conditions. These costs are incurred regardless of weather or annual usage.

Individual Rate Designs

Q. Could you please summarize your approach to the design of individual rates?

A. My process employed five steps. First I established class revenue targets using an equal percentage increase for all classes, as previously discussed, on Schedule PMN-1G-8, pages 2 and 3. Second, I determined the rate structure for the proposed rates. Due to the level of the Company's total dollar increase and emphasis on fixed cost recovery for Distribution, I proposed no changes to the existing block structure breaks as identified on Schedule PMN-1G-8, page 1 of 8, columns G and H. The third step was to establish proposed customer charges more reflective of my cost study results. The fourth step was to derive proposed block prices. The fourth step also considered a reduction (narrowing) or elimination of the existing block structure price differential. The final step was to compute the residual revenue requirement and head block for each rate. Once these charges were derived, I simply calculated the achieved revenue levels based on the Company's billing statistics and compared these results to my revenue targets as shown on page 6, columns (AD) through (AF) to calculate the revenue variance to targets (column (AG)).

Q. How did you establish customer charges?

A. I determined customer charges with consideration of several conflicting goals – to establish customer charges at the levels indicated in the marginal cost of service study. By setting proposed prices towards costs (higher fixed cost), we are improving pricing efficiency which will reduce the existing large fixed cost recovery through current volumetric charges. I also propose reducing existing block differentials so as to recognize this increased fixed revenue recovery from the higher proposed monthly customer charges. While proposed monthly customer charges are still somewhat less than costs to serve (Residential), they do reflect a considerable improvement in fixed cost recovery as shown on Schedule PMN-1G-8, page 4 of 8, columns X through AD. This pricing goal of fixed cost recovery (Distribution) is paramount to reducing the rather large intra-class subsidies that currently exist in the Company's rate structures through the recovery of these costs in current volumetric charges. These class subsidies exist primarily due to the fact that the majority of distribution costs are fixed in nature and should be recovered through a monthly fixed charge. Presently the level of fixed costs recovery is very small (less than 1/3) for Residential R-2 (Schedule PMN-1G-8, page 4, columns C and D) which results in smaller customers being heavily subsidized by larger users. The proposed rate design makes a major effort to correct this shortcoming by increasing only the fixed cost recovery to 50.5% (PMN-1G-8, page 6, column Y).

Q. Are you also proposing to introduce a new monthly facility charge to recover the additional fixed costs you identified and discussed earlier in your testimony?

A. No, I am not at this time. My efforts are primarily to identify and point out that most of the Company's delivery system costs are fixed in nature whether they be customer or capacity related. Unfortunately, the regulatory process has historically required that a large portion of fixed costs be recovered in the variable usage component of approved pricing levels. This approach simply promotes inefficiencies while maintaining somewhat large discounts for lower consumption levels. This occurs by simply establishing volumetric prices at a much higher level by including fixed costs recovery which ultimately provides the consumer with incorrect and inflated pricing levels with which to make consumption decisions. My effort in this proposed rate design is to begin the important process of placing greater emphasis on the proper and equitable recovery of fixed costs from an inter-class and intra-class basis.

Q. Do your proposed class customer charges recover your calculated accounting and marginal monthly costs?

A. No, they do not. For Residential, the proposed recovery is still much lower than costs, but a major step has been proposed to reduce these inequities. Schedule PMN-1G-8, page 6 of 8, columns X and Y, shows the calculated costs versus the proposed. As can be noted at the bottom total for each column, the proposed total fixed customer costs' under-recovery is still approximately $1.3 million. The

proposed customer charge for the C&I classes was increased to recover this rather large fixed cost shortfall from Residential.

Q. How did you establish the block rate pricing levels?

A. The proposed rate blocking charges are based on the changes in the blocking differential for each rate as shown on Schedule PMN-1G-8, page 5 of 8, columns (S) and (T). The percentages shown on this page represent the proposed changes from the corresponding existing base levels due to increasing fixed cost recovery. My goal for each rate was to reduce or eliminate the level of existing block differentials in the rate design due to proposed increases in fixed cost recovery. The remaining revenue requirement for each class, after subtracting the proposed monthly customer, is then the basis for the proposed final block pricing. The specific seasonal and block differential associated with G- and T-51 are detailed separately on page 8 of 8.

Q. How have you derived your proposed Residential non-heating rate?

A. The Residential non-heating class exhibits the poorest results from either cost of service study with respect to revenue targets or rate of return benchmarks. As such, the underlying costs are fixed and very high when compared to the total revenues and costs due to the much lower consumption levels. In order to propose a more meaningful recovery from this much smaller rate class, I developed the proposed rate structure as having the customer charge equal to (same) the Residential heating rate and the first block equal to the same relationship (74.75%) as currently exists with the approved rate levels. I then

maintained this level for all block pricing in each season similar to the existing rate structure.

Q. Have you calculated the realized or achieved class rate of return levels based on your proposed rate levels and corresponding revenue recovery?

A. Yes, I have. Schedule PMN-1G-8, page 3 of 8, shows the comparison of the proposed (column AD) versus the existing (column AE) ROR using the COSS model. Overall residential class RORs have moved closer towards the system average ROR. Unfortunately, limiting the overall increase to this class results in a higher level of subsidization from the C&I classes which creates much higher ROR than the system overall.

Q. Does this conclude your testimony?

A. Yes, it does.