

**THE STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION**

DG 11-069

NORTHERN UTILITIES, INC

**DIRECT TESTIMONY OF
PAUL M. NORMAND**

**ACCOUNTING COST OF SERVICE STUDY
MARGINAL COST OF SERVICE STUDY
RATE DESIGN**

EXHIBIT PMN-1

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LIST OF SCHEDULES

Schedule Number	Description
	<u>Accounting Gas Cost of Service Study</u>
PMN-1G-1	Qualifications of Paul M. Normand
PMN-1G-2	– Total Company Cost of Service Study (Reference Workpapers for Detailed Cost Allocation)
	– Detailed Revenue Reconciliation
	– Unbundled Total Class Revenue Requirements
PMN-1G-3	Total Delivery Only Cost of Service Study
PMN-1G-4	Total Production Only Cost of Service Study
PMN-1G-5	Total Functional Cost of Service Study
PMN-1G-6	Total Class Unbundled Revenue Requirements and Unit Cost Results at Existing and Uniform Proposed Rate of Return
PMN-1G-7	Tabulation of External and Internal Allocators
PMN-1G-8	Rate Design Summary
PMN-1G-9	Bill Impacts at the Proposed Pricing Changes

<u>Schedule Number</u>	<u>Description</u>
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Long-Run Marginal Cost Study

PMN-2G-1	Discussion of Marginal Cost Analysis
PMN-2G-2	Table 1 Production Plant Investment
	Table 2 Capacity-Related Distribution Plant
	Table 3 Customer-Related Distribution Plant
	Table 4 Marginal Production O&M Expenses
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	Table 14 Final Marginal Revenue Requirement Based on Equi-Proportional Adjustment

1 **I. INTRODUCTION**

2 **Q. Please state your name, address and position.**

3 A. My name is Paul M. Normand. I am a management consultant and President of
4 Management Applications Consulting (“MAC”), Inc., 1103 Rocky Drive, Suite
5 201, Reading, PA 19609.

6 **Q. Please state your qualifications.**

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

8 **II. SCOPE OF TESTIMONY**

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

10 A. I am responsible for preparing the accounting and marginal gas cost studies
11 submitted on behalf of Northern Utilities – New Hampshire Division d/b/a Unitil
12 (“Unitil” or “the Company”). I am also responsible for preparing the weather
13 normalization adjustments, developing the class revenue targets, and rate design
14 for each of the Company’s proposed rates.

15 In addition to these studies, I am also supporting the depreciation study in this
16 filing which has been submitted under separate cover.

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

18 A. Aside from the introductory material provided in Sections I and II, my testimony
19 is organized into three major sections. Section III presents as additional cost
20 information, an accounting Class Cost of Service Study (“COSS”) and the

1 methods I have employed to calculate costs by class of service, including the
2 more significant allocation factors. In Section IV, I discuss the results of my
3 Marginal Cost Study. This study was prepared and utilized as the primary
4 determinant relied upon in arriving at my final class revenue targets and rate
5 design proposals. In the final section, Section V, I discuss the development of the
6 proposed class revenue targets, the individual class rate design proposals, and
7 associated tariffs.

8 In my two cost of service studies, I have provided a total of 11 schedules: nine
9 accounting using “PMN-1G” and two marginal using “PMN-2G” designations.
10 Schedule PMN-1G-1 details my qualifications and experience. The schedules
11 relating to the accounting cost of service study are labeled sequentially beginning
12 with Schedule PMN-1G-2. Schedule PMN-1G-2 summarizes the results of my
13 Total Company COSS. Page 5 of this Schedule details each revenue component
14 and reconciles to the total Company revenue requirements. The last two pages (6
15 and 7) present the unbundled cost of service result summaries by class of service.
16 On page 7, column 23 shows the cost of service target revenues at the required
17 equalized revenue requirement as shown in Schedule PMN-1G-3, page 43, line
18 10. This class revenue requirement detail is also provided on Schedule PMN-1G-
19 6, pages 5 and 6, line 19. In addition to these traditional total Company class cost
20 of service study summary results, Schedule PMN-1G-3 presents the more detailed
21 results of my COSS for the delivery function only. In this Schedule, I have
22 removed supply-related costs to be recovered through the Cost of Gas Adjustment

1 Clause. Schedule PMN-1G-4 shows a similar level of cost detail by customer
2 class as Schedule PMN-1G-3, but for only the supply-related costs (Production)
3 instead of the delivery-related cost function (Schedule PMN-1G-3). Schedule
4 PMN-1G-5 presents a similar level of cost detail as Schedules PMN-1G-3 and
5 PMN-1G-4 for the total unbundled costs for the supply and delivery functions
6 instead of by rate class as shown on the horizontal. This Schedule also identifies
7 the Cost of Gas Adjustment (CGA) direct Gas Costs and CGA Bad Debt costs
8 included in the supply function as summarized in Schedule PMN-1G-2. Schedule
9 PMN-1G-6 presents a detailed functional unbundled summary of the costs to
10 serve for each rate class at both present and equalized rates of return (ROR).
11 Schedule PMN-1G-7 contains a detailed description of the allocation factors, both
12 externally developed and those developed internal to the COSS to provide a
13 complete reference and understanding of the allocation methods employed in my
14 study.

15 Schedule PMN-1G-8 presents the details of the proposed rate design calculations
16 along with the summaries from all of the COSS results discussed earlier
17 (Schedule PMN-1G-3 and Schedule PMN-1G-6). Schedule PMN-1G-9 presents
18 the bill impacts (\$) and (%) for various usage levels for each of the proposed rate
19 pricing changes.

20 The marginal cost study schedules consist of two major schedules:

21 Schedule PMN-2G-1, a detailed discussion of the marginal cost study, and
22 Schedule PMN-2G-2, which consists of 14 separate tables that present the

1 detailed calculations as described in Schedule PMN-2G-1. These 14 tables show
2 all of the significant calculations underlying the development of marginal costs
3 which are being provided as principal pricing support for the proposed rate design
4 as developed on Schedule PMN-1G-8 based on the marginal cost study results
5 and class revenue requirements.

6 In order to facilitate a thorough review of my cost studies, I have included a
7 complete set of workpapers with this filing, labeled as “Gas Accounting Cost of
8 Service @ 12/31/10 Workpapers” and “Gas Marginal COS @ 12/31/10
9 Workpapers.”

10 **Q. Have you prepared a lead-lag analysis for the Company as part of this filing?**

11 A. I am currently preparing a lead-lag analysis for this filing which will be provided
12 as an update as soon as it is completed.

13 **III. ACCOUNTING COST OF SERVICE STUDY**

14 **Weather Normalization**

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

16 A. For the purposes of rate making, the test year must represent typical or normal
17 circumstances. Mr. David Chong has identified specific adjustments to the test
18 year to reflect the expenses that normally would be anticipated in the test year.
19 One of those adjustments is to reflect the costs and revenues that could be
20 expected under normal weather conditions. The Company’s sales are weather
21 sensitive. Even small variations in weather can have a material impact on the

1 sales and revenues of the Company. The weather normalization adjustment is
2 targeted to identify the change in sales and revenues that would have been
3 anticipated if the actual weather in the test year had been exactly normal.

4 **Q. How do you define normal weather?**

5 A. Normal weather should equal the average anticipated degree days over the last 30
6 years. The Company has provided historical daily weather data. In my
7 Workpapers, I summed the most recent 30 years of monthly data and then
8 averaged each month to derive the expected monthly degree days in a normal
9 year.

10 **Q. Please describe your weather normalization calculations.**

11 A. I have summarized the weather normalization calculations in the filed
12 Workpapers which also show the monthly per-books sales data for 2010. The
13 Workpapers show the derivation of the billing cycle degree days including actual
14 and 30-year normal degree days by calendar month. Since monthly customer
15 billing data are recorded on a billing cycle basis, the actual sales data incorporate
16 some lag due to meter reading. I computed weighted average actual and normal
17 degree days for each billing month. This same process was repeated for all sales
18 and transportation categories.

19 **Q. Could you describe the actual weather normalization calculations?**

20 A. Base load is computed as the average use per customer in the months of July and
21 August. I made a minor adjustment to this calculation in those cases where the

1 months' Billing Cycle Sales were below the July and August average. If the sales
2 were below the July and August average, I did not weather normalize those
3 months because they did not show any sensitivity to weather. Monthly sensitivity
4 to degree day variations is computed by dividing the heating load by the actual
5 billing cycle degree days to derive the actual unit heating load per degree day.
6 This figure was then multiplied by the temperature departure from normal to
7 develop a weather adjustment. In some months, actual weather was warmer than
8 normal while in others it was colder. In total, the year was slightly warmer than
9 normal, resulting in a positive weather adjustment to sales.

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

11 A. Starting on Page 93 of the Workpapers, the CCF values shown in the column
12 labeled "Weather Adjustment" on this schedule represent the monthly
13 adjustments due to the variation from normal weather (30-year average). The
14 volumetric weather adjustment was multiplied by the variable rate in each of the
15 present tariffs based on the monthly average use to derive the revenue impact as
16 shown on the right-most column of these pages. Page 108 of the Workpapers
17 presents the weather normalized billing month sales under present rates. Page
18 107 of the Workpapers shows adjustment to base revenues from actual to normal
19 weather conditions.

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 accounting cost of service study, I adjusted billing cycle sales data to restate them on a calendar month basis. This calculation employed the same billing cycle lag factors by rate class used to develop billing month degree days resulting in the calendar month data in the Workpapers, Page 118 at the sendout level which includes an adjustment for losses.

Allocated 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 and return on investment. 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 an Allocated Cost of Service Study is to assign or allocate each relevant component of Unitil'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 Allocated Cost of Service Study?

A. Through the application of a microcomputer 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 Unitil's total Company

1 costs to serve as presented by Mr. Chong and summarized in my revenue
2 reconciliation, Schedule PMN-1G-2, Page 5.

3 **Description of Cost Model**

4 **Q. How does the computerized cost model operate?**

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

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

15 Each page, starting with page 1, has a column immediately preceding the
16 numerical data marked "ALLOC," an abbreviation for ALLOCATOR. The
17 ALLOC column contains an acronym to indicate the allocation factor used to
18 allocate the costs shown in the Total Company column to individual customer
19 classes. A tabulation of these allocators, typically total dollars or volumes, and as
20 a percent of total has been provided at the end of each study beginning on Page 45
21 of Schedules PMN-1G-3 and PMN-1G-4. In addition to a simple tabulation, these

1 allocation factors are further presented as a unitized ratio of Total Company
2 beginning on Page 61 of Schedules PMN-1G-3 and 1G-4. Schedule PMN-1G-7
3 further describes each of these allocators.

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

9 **Cost of Service Model Allocation Methodology**

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

11 A. Generally speaking, I use a hierarchal approach to assign costs to customer
12 classes, choosing the highest level available to assign or allocate cost elements in
13 the cost study. The first or highest level is to identify a direct relationship
14 between the cost under study and the individual classes. For example, present
15 revenue is booked by customer class, so in the cost study, I directly assign present
16 revenues to customer classes. The second level in the hierarchy employs the
17 results of special studies. When costs cannot be directly assigned to a specific
18 class, a special study can be undertaken to replicate the intended use of specific
19 plant investments or expenses and then assign costs based on the specific use of
20 these assets in the test year. The next level in the hierarchy employs an external
21 allocator to serve as a basis for cost assignment. For example, the cost of
22 processing a computer generated bill is the same for all classes. An external

1 allocator representing the number of bills produced for each customer class in the
2 test year was developed to allocate these costs. The final alternative, using an
3 internal allocator for cost assignment, involves selecting some combination of
4 cost elements previously allocated in the cost study to assign certain remaining
5 costs appropriately to customer classes. An internal allocator is a relationship
6 computed from combining more than one cost already allocated in the cost study.
7 As an example, property taxes are assessed by individual taxing authorities based
8 primarily on the plant in service within their jurisdictions. In order to allocate
9 property taxes, I develop an internal allocator for the total of all plant. In this case,
10 total **PLANT** is an internal allocator composed of the sum of each individual item
11 of plant in service, each of which has been previously allocated to customer
12 classes on some rational basis. Using this costing approach, I assigned each rate
13 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 3 through 14 of Schedules PMN-1G-2 and PMN-1G-3. 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 two internally developed allocators, total plant and total labor.

Production plant is primarily assigned using a Design Day remaining allocation factor, which is based on adjusting the total Design Day demand lower by removing a base use component (two-month average) for each rate class. The Company does not have any production or storage plant balances.

Next, distribution capacity-related plant was assigned to classes on the basis of allocation factor **DISTR**. This allocation factor was developed externally and is used for the allocation of distribution plant capacity-related costs such as distribution land and land rights, structures and improvements, compressor station equipment, measuring and regulating station equipment, and mains. The allocator **DISTR** itself is 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.

1 **Q. Please describe briefly the Proportional Responsibility method?**

2 A. This method, often abbreviated as the “PR” method, has a long history of
3 acceptance as an appropriate distribution capacity allocator for gas distribution
4 utilities in other jurisdictions.

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

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

13 A. The PR procedure essentially results in an overall weighting of 85.8% to the
14 winter period and a complementary 14.2% to the summer period as shown in the
15 Workpapers. The winter period consists of the months of November through
16 April, with the remaining months being included in the summer period.

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

19 A. Customer-related distribution plant items were allocated using CUST-prefixed
20 allocators for services, meters, and other such customer-related items. These
21 factors, taken from the Company's continuing property records, general

1 accounting records, and any other available sources, serve to allocate the specific
2 customer-related costs incurred for each customer class.

3 The allocation of Services (Account 380) was based on current installed-cost-per-
4 customer class using historical Company data with recognition of the total
5 number of services in arriving at the final number of services per class. Similarly,
6 the allocation of Meters (Account 381) was developed by identifying the typical
7 replacement cost new for meters used to serve each rate class.

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

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

13 A. The general plant items, excluding the METSCAN and ITRON communication
14 equipment (Account 397), were allocated on an internally developed labor
15 allocation factor (**LABOR**), which was based on labor expensed and capitalized
16 for each account in the test year. The labor portion of each Operation and
17 Maintenance function was identified and allocated separately in the same manner
18 as the corresponding total expense accounts were allocated. Similarly, capitalized
19 labor costs were assigned to classes on the same basis as the plant function. The
20 allocated labor costs were then subtotaled by class to arrive at the composite
21 allocation factor, **LABOR**. The detailed development of this allocator is

1 presented on Pages 37 through 42 of Schedules PMN-1G-3 and PMN-1G-4 of the
2 cost of service studies.

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

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

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

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

12 A. Additions to net plant included prepayments, materials and supplies, and an
13 allowance for cash working capital, which I developed in a separate analysis. The
14 deductions from net plant were customer deposits, customer advances, unclaimed
15 checks and a reserve for deferred federal income taxes. Each item was allocated
16 on the most appropriate allocation factor. Customer Deposits were directly
17 assigned to rate classes. (See Workpapers.)

Operating Revenue Allocations

Q. Could you discuss the allocation of operating revenues?

A. Revenue details are shown on Pages 15, 16, 59, and 60 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 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 Market Based Allocation ("MBA"). The gas revenues and direct gas costs were exactly offset by rate class. The costs associated with Propane (LPG) and Liquefied Natural Gas (LNG) were

1 allocated on the DEMLPG and DEMLNG factors, which are each based on a
2 Design Day remaining calculation, as previously discussed, with plant costs. The
3 details relating to these expenses are developed in Schedules PMN-1G-4 and
4 PMN-1-G-5. A summary of these revenue requirements is presented on Schedule
5 PMN-1G-2, page 6 of 7.

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

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

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

17 **Q. What are the remaining operating expenses?**

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

1 **Q. How were they allocated?**

2 A. Depreciation and amortization expenses were allocated on the basis of plant in
3 service similar to the allocation of depreciation reserves. Taxes Other Than
4 Income Taxes that are plant-related were allocated on **PLANT**, and those that are
5 labor-related were allocated on the **LABOR** allocator discussed earlier. Interest
6 on Customer Deposits was allocated on customer deposits (CUSTDEP). Federal
7 income taxes and state franchise taxes were computed for each customer class
8 based on their individual revenues less allocated expenses.

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

11 A. The results of this study demonstrate that the rates presently in effect generate
12 very different rates of return for each customer class (reference lines 20 and 21 of
13 Page 1). As Schedule PMN-1G-2 demonstrates, the Company's current rates
14 produce large inequities between rate classes.

15 **Unbundled Costs to Serve**

16 **Q. How does your accounting cost of service study relate to the development of**
17 **unbundled cost to serve the gas supply and transportation functions?**

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

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In order to provide unbundling cost details and provide a useful guide to delivery rate design efforts, the cost of service study 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 cost study 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.

15

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

16

17

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.

20

21

The completed functional cost study results, Schedule PMN-1G-5, shows the allocation of each item contributing to revenue requirements, summarized into the

22

1 Production and Delivery cost functions. The allocation factors used to develop
2 this study are listed, beginning on Page 23 of the functional cost of service study.
3 Please note that Schedule PMN-1G-5 is also the exact result for the total columns
4 only from the class Delivery and Supply unbundled studies, Schedules PMN-1G-
5 3 and PMN-1G-4 for class cost study details. The functional revenue
6 requirements from Schedule PMN-1G-5, page 22, line 10, are further detailed by
7 cost function and class of service in Schedule PMN-1G-2, pages 6 and 7.

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

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

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

18 A. Existing base rates were previously unbundled to include only distribution costs
19 and exclude production-related costs. Therefore, the costs shown on Schedule
20 PMN-1G-3 are directly comparable to the proposed revenues produced by base
21 rates. These summary results are also presented in the more detailed class
22 unbundled cost summary results, Schedule PMN-1G-6 (line 19). Please note that

1 Schedule PMN-1G-6 contains results at both the existing (pages 1 through 4) and
2 the proposed (pages 5 through 8) equalized rate of return levels. A complete
3 revenue reconciliation showing each component has been provided in Schedule
4 PMN-1G-2, pages 5 through 7.

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

7 A. The unbundled class cost results from this study detail clearly show that the
8 delivery costs to serve Unitil's customers are essentially fixed in nature and are
9 either capacity or customer related. These results suggest that the cost recovery
10 and pricing should emphasize fixed monthly charges, especially for smaller
11 customers where comparable investments are necessary regardless of total
12 consumption.

13 **Q. Does the cost of service study provide additional information needed to**
14 **update the Company's CGAC?**

15 A. Yes. The cost study presented in Schedule PMN-1G-4 segregates Indirect Gas
16 Supply Costs from delivery revenue requirements to aid in the updating of the
17 Cost of Gas Adjustment Clause (CGAC). Since these Indirect Gas Supply Costs
18 are associated with providing Supply service, it is important to update these costs
19 to incorporate into the CGAC (reference Schedule PMN-1G-2, pages 6 of 7).

20 First, the study identifies the costs associated with the owning and operating of
21 the Company's manufactured gas facilities. For the most part, these LP- and

1 LNG-related costs are incurred to provide gas supplies on extremely cold days.
2 Consequently, the LP and LNG costs were assigned to the Supply function.

3 The second item addresses operations and maintenance expenses associated with
4 the gas acquisition and gas dispatching costs, including any associated legal
5 expenses. The gas dispatching, gas acquisition and legal costs are booked in
6 Accounts 813, 880, and 928. The operations and maintenance expenses
7 associated with gas supply must be unbundled from the transportation rates.
8 Consequently, my cost study explicitly removes these supply-related costs from
9 the delivery revenue requirement and assigns them to gas supply function. A
10 detailed derivation of these costs is also contained in the filed Workpapers.

11 The third item concerns overhead costs such as general plant and administrative
12 and general expenses. Although the majority of these costs are associated with
13 the delivery function, it is obvious that a portion of these costs must be gas
14 supply-related as well. I have automatically assigned a portion of general plant
15 and administrative and general expenses to the gas supply function through the
16 allocation process by the selection of internally developed allocators. As an
17 example, the labor allocator includes the labor associated with LP and LNG plant
18 operations and maintenance expenses, which are primarily gas supply-related
19 costs. Consequently, the overheads allocated on the basis of labor will properly
20 include an assignment of these costs to the gas supply function. Schedule PMN-
21 1G-2, pages 6 and 7, presents the class summary revenue requirements
22 completely unbundled.

1 **IV. MARGINAL COST OF SERVICE STUDY**

2 **Overview of Marginal Cost Study**

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

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

7 A marginal cost study provides an estimate of the additional cost of providing an
8 additional unit of service. These cost estimates are utilized as a starting point or
9 reference in setting rates to the extent allowed by considerations of rate
10 continuity, intra-class equity, and customer impact. The use of marginal costs in
11 ratemaking tends to result in prices that best promote economically rational
12 consumption decisions, and thereby promotes an efficient allocation of society's
13 resources. Sending customers accurate price signals regarding the costs that will
14 result from their consumption decisions furthers efficiency. Customers, in turn,
15 will be able to make informed decisions on their use of utility service.

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

17 A. The Northern Utilities New Hampshire Marginal Cost Study (NUMCS)
18 establishes marginal revenue levels and prices for each rate class on the basis of
19 marginal costs, adjusted using the Equi-Proportional Method (EPM) to recover
20 the allowed total revenue requirements requested by the Company as shown on
21 Schedule PMN-2G-2, Table 14. The proposed total system and class delivery
22 service revenue requirements are established at the adjusted test year levels.

1 Delivery service marginal costs by class (which differ from the revenue
2 requirement) are then adjusted to equal the delivery system total revenue
3 requirement (Schedule PMN-1G-2, page 5 of 7, line 12) on a pro-rata basis using
4 the EPM. The resulting scaled marginal costs by class and cost component then
5 become the theoretical targets for the design of delivery service rates. These
6 results are presented as a final comparison in the rate design process on Schedule
7 PMN-1G-8, page 7 of 8.

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

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

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

21 A. Yes. I have computed the marginal costs to serve each of Northern Utilities'
22 existing New Hampshire rate classes based on test year costs. I have used

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

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

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

1 **V. RATE DESIGN**

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

5 A. Yes, these can be reviewed as follows:

6

<u>Schedule</u>	<u>Description</u>	<u>Page</u>
PMN-1G-2	Class ROR Results	1 & 2
	Existing Revenue Requirements and Equalized ROR	3 & 4
	Revenue Reconciliation Details	5
	Unbundled Class Revenue Requirements	6 & 7
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-2G-2	Marginal Cost – Table 14	
PMN-1G-8	Rate Design Summary and Calculations	

7 The above schedules provide all of the detail required to design rates to produce
8 the overall class revenue requirements for delivery of \$20,968,864 based on an
9 equalized 7.65% ROR. This represents a \$3,887,999 increase on existing base
10 revenues of \$17,080,865 (Schedule PMN-1G-2, page 5 of 7).

11 **Revenue Targets**

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

14 A. The overall class rate design calculations are presented on Schedule PMN-1G-8.
15 My initial derivation of class revenue targets was based on the goal of setting all
16 customer class revenue requirement levels at the adjusted marginal (EPM)

1 revenue targets as shown on Schedule PMN-1G-8, page 2 of 8, columns (S)
2 through (U). Unfortunately, this approach results in some unacceptable larger
3 increases to existing Residential and G- and T-40 revenue levels, which
4 necessitated a proposed reduced increase from the marginal cost of service results
5 as I have proposed and detailed on Schedule PMN-1G-8, Rate Design.

6 This schedule contains eight pages of detail calculations as follows:

Page Description

- 1 Class Summary of Billing Units and Blocking Levels
- 2 Summary of Marginal Cost of Service Results and Derivation of Class
Revenue Targets (Schedule PMN-2G-2, Table 14
- 3 Summary of the Proposed Increases by Customer Class with a Rate of
Return Comparison at Existing (Column AD) and Proposed Revenue
Levels (Column AC)
- 4 Summary of Existing Charges and Proposed Customer Charges, Existing
Block Pricing Levels, and Differentials
- 5 Summary of Proposed Seasonal Block Charges, Percent Increases over
Existing Levels and Proposed Block Differential
- 6 Final Proposed Revenue Recovery by Rate Component for Each Rate Class
- 7 Summary Results of Accounting and Marginal Cost of Service Studies
(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

7 **Q. How did you establish your class revenue targets?**

8 A. I reviewed all aspects of the cost of service studies and their results as
9 summarized on Schedule PMN-1G-8, page 7 of 8, and utilized the results of the
10 class marginal cost of service study as my starting point as shown on page 2 of
11 this Schedule.

1 I limited or capped certain rate class increases (R-5, R-6, R-10, R-11, G-40, and
2 T-40) using a ratio applied to the overall Company increase requested for
3 distribution rates and then recovered any resulting class shortfall, by allocating
4 their capped deficiency to the remaining larger uncapped classes (G- and T-41,
5 42, 51, and 52). Specifically, the class revenue targets for Residential (R-1, R-11,
6 R-2, and R-12) were all based on establishing a capped level of revenue increase
7 of 26.18%, derived by multiplying the Company's proposed overall average
8 distribution rate increase of 22.76% by 1.15. (Reference Schedule PMN-1G-8,
9 page 2, columns T and U.) The calculated Residential revenue shortfall is then
10 allocated to the larger general service rate classes (G- and T-41 and 51; G- and T-
11 42 and 52) based on their marginal EPM revenue requirement levels (Schedule
12 PMN-1G-8, page 2 of 8, columns (S) and (W). I have chosen this reduced 1.15
13 level as a conservative approach to allow some progress toward marginal cost-
14 based rates and recognizing the divergence between my marginal and accounting
15 cost of service class results as summarized on page 7 of this Schedule PMN-1G-8.

16 Having determined the residential revenue shortfall realized based on the 115%
17 cap level just described, I allocated these excess revenues to the G- and T-41, 51,
18 42 and 52 in a manner that will achieve the following class results:

- 19 1. No customer class will be decreased and the lowest revenue increase target
20 will be 10%. This constraint can be noted on Schedule PMN-1G-8, page 3 of
21 8, lines 31 (G- and T-42) and 33 (G- and T-52) in column (AA).

2. Once this revenue increase minimum was determined in Step 1, above, the next step was to sum both of these increases and then reallocate this total amount to the G- and T-41 and 51 in a manner that achieves both of these rates to be increased by the same percentage (about 18%) as shown on Schedule PMN-1G-8, page 3 of 8, columns (AA) and (AB).

6 Individual Rate Designs

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

8 A. My process employed five steps. First I established class revenue targets, as
9 previously discussed, on Schedule PMN-1G-8, pages 2 and 3. Second, I
10 determined the rate structure for the proposed rates. Due to the level of the
11 Company's total dollar increase and customer impacts, I proposed no changes to
12 the existing block structure breaks as identified on Schedule PMN-1G-8, page 1
13 of 8, columns G and H. The third step was to establish proposed customer
14 charges. The fourth step was to derive proposed block prices. The fourth step
15 also considered a reduction or narrowing of the existing block structure price
16 differentials. The final step was to compute the residual revenue requirement and
17 head block for each rate. Once these charges were derived, I simply calculated
18 the achieved revenue levels based on the Company's billing statistics and
19 compared these results to my revenue targets as shown on page 6, columns (AC)
20 through (AE) to calculate the revenue variance to targets (column (AF)).

21 **Q. How did you establish customer charges?**

1 A. I determined customer charges with consideration of several conflicting goals – to
2 establish customer charges at the levels indicated in the marginal cost of service
3 study, customer impacts, and to also encourage conservation by moderating the
4 increase in customer charges and reduce existing block differentials so as to raise
5 volumetric charges. The proposed customer charges are therefore somewhat less
6 than costs to serve but reflect a measureable improvement of cost recovery as
7 shown on Schedule PMN-1G-8, page 4 of 8, columns C through F. The proposed
8 levels are above the average total class increase as an underlying goal of moving
9 these and total distribution fixed costs closer to cost of service as derived in my
10 cost studies and summarized on this page. This goal of fixed cost recovery
11 (distribution) is paramount to reducing the inter- and intra-class subsidies that
12 currently exist in the Company's rate structures.

13 **Q. How did you establish tail block rates?**

14 A. The proposed rate blocking charges are based on the changes in the proposed
15 blocking differential where applicable for each rate as shown on Schedule PMN-
16 1G-8, page 5 of 8, columns (Q) and (R). The percentages shown on this page
17 represent the proposed increases from the corresponding existing base levels. My
18 goal for each rate was to reduce the level of existing block differentials in the rate
19 design process using the remaining revenue requirement for each class after
20 subtracting the proposed monthly customer charge revenue recovery. The
21 specific seasonal and block differential associated with G- and T-51 are detailed
22 separately on page 8 of 8.

Dual Fuel Rate

Q. How should your cost of service studies be used to develop a dual fuel rate for Northern's customers?

A. Dual fuel customers can impose a constraint on the Company's deliverability if they are requesting firm service. Under this aspect of service, the Company will plan system capability to ensure that adequate capacity will be available. The long-run marginal costs for the Company's distribution facilities are identified on Schedule PMN-2G-2, Table 9, line 31 (column 5), as follows:

Full Marginal Distribution Capacity Costs per Design Day of \$11.46 per CCF

This amount would be applicable as the minimum annual revenue requirement threshold for firm dual fuel service times their appropriate contract Minimum Daily Quantity (MDQ) as established by the Company. It is important to recognize that there are fixed costs for which the Company must plan that must be recovered from all firm customers as also discussed in Mr. Gantz's testimony.

Q. How would you establish the appropriate billing units to consider in applying any charges to a dual fuel customer?

A. There are several steps that would have to be undertaken to ensure that a reasonable demand (MDQ) be established:

1. Hourly rating of all dual fuel equipment times 24 hours
2. Peak day estimated use agreed to by Company and customer

1 **Q. Should the marginal cost price you just stated be adjusted annually?**

2 A. Yes, it should. For any contract period greater than one year, the established price
3 should be adjusted using the most currently available gross domestic product
4 price index (GDP-PI) annual inflation index. This adjustment should be at the
5 contract anniversary date or on a calendar year basis.

6 **Bill Impact Analysis**

7 **Q. Have you prepared an analysis of the impact of your proposed rates?**

8 A. Yes, this analysis is shown on the 20 pages of Schedule PMN-1G-9. For each
9 rate class, I have shown the total charges under present and proposed rates for a
10 variety of usage levels. I have also indicated on the left portion of each page the
11 percentage of bills appearing within each usage level. Each page of Schedule
12 PMN-1G-9 shows the currently approved COG charges for each rate. The COG
13 charges have been adjusted (reduced) to reflect the calculated changes in the
14 Company's indirect costs (Schedule PMN-1G-2, page 6 of 7), page 6 of 7.

15 **Q. Does this conclude your testimony?**

16 A. Yes, it does.

QUALIFICATIONS OF PAUL M. NORMAND

Q. Mr. Normand, what is your present position?

A. I am a principal in the consulting firm of Management Applications Consulting, Inc. (MAC), 1103 Rocky Drive, Suite 201, Reading, PA 19609. This company provides consulting services to the utility industry in such field as loss studies, econometric studies, cost analyses, rate design, expert testimony, and regulatory assistance.

Q. What is your educational background?

A. I graduated from Northeastern University in 1975, with a Bachelor of Science Degree and a Master of Science Degree in Electrical Engineering-Power System Analysis. I have attended various conferences and meeting concerning engineering and cost analysis.

Q. What is your professional background?

A. I was employed by the Massachusetts Electric Company in the Distribution Engineering Department while attending Northeastern University. My principal areas of assignment included new service, voltage conversions, and system planning. Upon graduation from Northeastern University, I joined Westinghouse Electric Corporation Nuclear Division in Pittsburgh, Pennsylvania. In that position, I assisted in the procurement and economic analysis of electrical/electronic control equipment for the nuclear reactor system.

In 1976, I joined Gilbert Associates as an Engineer providing consulting services in the rate and regulatory area to utility companies. I was promoted to Senior Engineer in 1977, Manager of the Austin office 1980, and Director of Rate Regulatory Service in 1981.

In June, 1983, I left Gilbert to form a separate consulting firm and I am now a principal and President of Management Applications Consulting, Inc. My principal areas of concentration have been in loss studies, economic analyses, and pricing.

Q. Have you testified in support of any cost studies that you participated in or performed?

A. Yes, I have testified about such studies before the following regulatory agencies: the New Hampshire Public Utility Commission, the Public Utility Commission of Texas, Illinois Commerce Commission, New Hampshire Public Utilities Commission, New Jersey Board of Public Utilities, New York Public Service Commission, Pennsylvania Public Utility Commission, the Massachusetts Department of Public Utilities, the Kentucky Public Service Commission, the Arkansas Public Service Commission, the Public Service Commission of Louisiana, the Public Utilities Commission of Ohio, the Public Service Commission of Missouri, the Delaware Public Service Commission, the Maryland Public Service Commission, the Indiana Utility Regulatory Commission, the North Carolina Utilities Commission, the Kansas Corporation Commission, and the Federal Energy Regulatory Commission.

Q. Could you please briefly discuss your technical experience?

A. I have performed numerous accounting and marginal cost of service studies, time differentiated bundled and fully unbundled cost studies for both electric and gas utilities since 1980. I have also used such studies in the design and presentation of detailed rate proposals before regulatory agencies. My additional experience has been in the area of unaccounted for loss evaluations for electric and gas utilities for over twenty-four years. These studies

include a detailed review of each system and the calculation of appropriate recovery factors.