Office of Pipeline and Producer Regulation
Washington, D.C. 20426

EXHIBIT NO. S-15

DEPRECIATION ANAYSIS AND RECOMMENDATION, & ACCOUNT NOs. 824 & 858 FOR NATURAL GAS PIPELINE COMPANY OF AMERICA

PREPARED DIRECT TESTIMONY OF

PATRICK R. CROWLEY

NATURAL GAS PIPELINE COMPANY OF AMERICA
DOCKET NO. RP93-36-000

Federal Energy Regulatory Commission

WASHINGTON,D.C.
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Exhibit No. S-15

FEDERAL ENERGY REGULATORY COMMISSION

OFFICE OF PIPELINE AND PRODUCER REGULATION

NATURAL GAS PIPELINE COMPANY OF AMERICA
DOCKET NUMBER RP93-36-000

PREPARED DIRECT TESTIMONY OF PATRICK R. CROWLEY

Q. Please state your name and business address.

A. My name is Patrick R. Crowley. My business address is 825 North Capitol Street, Washington, D.C. 20426.

Q. By whom are you employed and in what capacity?

A. I am employed by the Federal Energy Regulatory Commission as an Industry Economist in the Depreciation Branch of the Gas Pipeline Rates Division.

Q. What is your educational background?

A. I was graduated from DePaul University in 1976 with a Bachelor's Degree in Economics and again from DePaul with a Master's Degree in Economics in 1978.

Q. What are your duties at the Federal Energy Regulatory Commission?

A. My duties at the Commission include the responsibility for the analysis and development of the proper and adequate depreciation rates to be utilized by natural gas pipeline companies in the recoupment of the capital cost of physical property.

Q. Have you filed testimony in other Commission proceedings?

A. Yes, I have filed testimony in the following rate cases:

Black Marlin Pipeline Co., RP81-67-000
National Fuel Gas Supply Corp., RP83-105-000
Tarpon Transmission Co., RP84-82-000
National Fuel Gas Supply Corp.,RP86-136-000
Pacific Gas Transmission Co., RP87-62-000
Sea Robin Pipeline Co., RP88-181-000
Paiute Pipeline Co., RP88-227-000
U-T Offshore System, RP89-38-000
Southwest Gas Storage Co., RP89-60-000
Mississippi River Transmission Corp., RP89-248-000
Tarpon Transmission Co., RP84-82-004
Williams Natural Gas Co., RP91-152-000

In addition to the testimony I filed in those cases, I have prepared and supported Staff positions in many other oil and natural gas pipeline company cases over the last fifteen years which were resolved by settlements prior to the filing of testimony.

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

A. The purpose of this testimony is to present my analysis of the appropriate depreciation rates for gas plant in service for Natural Gas Pipeline Company of America (NGPL), and present my recommendations in regard to the appropriate cost levels of Account No. 858 and Account No. 824. My testimony includes this written prepared testimony explaining the derivation of the depreciation rates, my adjustments to Account No. 858 and Account No. 824, Exhibit No. S-15. Accompanying this writen testimony is a series of workpapers showing the calculations of the depreciation rates, Exhibit Nos. S-16 through S-23, and two workpapers showing the

Account Nos. 858 and 824 cost levels, Exhibit No. S-24 and S-25.

Q. Briefly summarize the major topics reviewed in your depreciation testimony.

A. Although the depreciation rates appear as a small set of numbers in the cost of service, their derivation encompass a wide range of complex topics. My testimony will review the following topics:

- the current and proposed depreciation rates and the resulting implied life or recovery periods,
- the nature of depreciation and the methodologies generally used to calculate the depreciation expense,
- the actual calculation of the Storage and Onshore Transmission rates,
- the derivation of the average remaining life of the plant in service,
- the long term gas supply forecast and NGPL's share of long term production,
- the near-term plant additions,
- the flaws in NGPL's UOP depreciation methodology,
- corrections to NGPL's UOP calculations, and
- the flaws in NGPL's life of reserves method.

Current and Proposed Depreciation Rates

Q. What are NGPL's current depreciation rates, what has NGPL filed for in this case, and what has Staff recommended?

A. The prefiled rates, NGPL's filed rates, and Staff's recommended rates are as shown below:

Plant	Prefiled Rate	NGPL's Filed Rate	Staff's Proposed Rate
Production	3.36%	2.75%	2.50%
Storage	2.38%	3.60%	1.90%
Onshore Trans.	2.27%	2.75%	1.70%
Offshore Trans.	2.80%	2.75%	1.80%

All other categories of plant should retain the existing depreciation rates. The depreciation rates for the Production plant and Offshore Transmission plant will be supported by Staff witness Mr. Feinstein. I am recommending depreciation rates for Storage plant and Onshore Transmission plant.

Q. Why have you recommended a change in the depreciation rates?

A. It is my opinion that NGPL's current and filed depreciation rates, as shown above, are in excess of what is needed for an adequate recovery of its investment. The determination of proper depreciation rates requires an estimate of the remaining life of the operation of the pipeline company. The estimation of the remaining life inherently includes a "zone of reasonableness" to allow for variation in the many factors that affect the remaining life. NGPL's rates are far outside that zone, i.e., NGPL's proposed rates will generate a greater depreciation expense and depreciate the facilities substantially faster than what is reasonable.

Q. What leads you to believe that NGPL's depreciation rates are beyond the zone of reasonableness?

A. Depreciation rates reveal the rate at which plant investment will be recouped - the implied life span of the facilities. You can calculate the remaining life that is implicit in the depreciation rates by dividing the net plant ratio (i.e., the net undepreciated plant divided by the gross depreciable plant investment) by the depreciation rate. NGPL's current depreciation rates would recoup the Storage plant within 18.25 years and recoup the Transmission plant in 15.75 years. NGPL's filed rates will result in the recoupment of the Storage plant in 12 years and the Onshore Transmission plant in 13 years. These rates and the implied life spans are shown on Exhibit No. S-16. As I will discuss later in this testimony, the gas supplies available to NGPL indicate a life span considerably longer than 12 or 13 years. NGPL's filed depreciation rates would recoup the remaining plant investment in almost half the actual remaining life span. This means that today's NGPL customers would be paying depreciation rates substantially higher than they should be paying and customers in ten years from now would pay nothing towards depreciation expense.

Q. What do you believe is the zone of reasonableness for NGPL's remaining economic life?

A. I believe that the zone of reasonableness lies in the neighborhood of 25 years. I am recommending depreciation rates for the Storage plant and Onshore Transmission plant based on an economic life expectancy of 25 years. This life expectancy is based on long term gas supply forecasts which I will discuss later in this testimony.

Depreciation Theory and Methodology

Q. What is the purpose of depreciation?

A. The purpose of depreciation is to spread the recovery of the capital cost of physical plant over the useful life of the facilities. That schedule of recovery, the depreciation rate, must be periodically reviewed to ensure the appropriateness of the recovery. This ensures that the capital costs are paid for by those customers that are using the plant and that those customers are paying no more than their fair share of the capital costs.

Q. Please define depreciation.

A. Depreciation, as defined by the Uniform System of Accounts prescribed for Natural Gas Companies, 18 C.F.R. Part 201 (1993) is:

> the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities and in the case of natural gas companies the exhaustion of natural resources.

Q. How is this loss of service value spread among the accounting periods and customers?

A. There are two generally accepted depreciation accounting methodologies used to recoup the plant investment over the life of the facilities for natural gas pipelines. These are the Straight Line Average Remaining Life (ARL) method and the Unit Of Production (UOP) method. Both methods seek to distribute the cost of the plant investment in a manner consistent with the actual use of the system. The Straight Line ARL method spreads the cost over the number of years that the facility is expected to provide a useful service while the Unit Of Production method spreads the costs over the number of units expected to flow through the system over its estimated life-span.

Q. Please explain how you determine a depreciation rate in general.

A. To determine the appropriate depreciation rate, one must first find the amount of the plant in service needed to be recouped. This is done by finding the depreciable plant in service and subtracting the reserve for depreciation. This remainder, the net plant, is then divided by the estimated remaining life. The result is an annual depreciation expense which is then divided by the depreciable plant in service to arrive at a depreciation rate. The difficulty, of course, is estimating the appropriate life expectancy. I will discuss the life expectancies along with the depreciation rate derivation for each category of plant by function later.

Depreciation Rate Calculation

Q. What methodology did you use to derive the depreciation rates for the Storage and Onshore Transmission rates?

A. I used the Straight Line Average Remaining Life (ARL) methodology for the Storage and Onshore Transmission plants because these facilities are not tied to any particular supply sources. These facilities are used to transport gas from all of NGPL's various gas supply points and thus the life expectancy is based on total gas supplies available and to be available to the NGPL system. In this methodology, the net plant (which is the plant in service minus the reserve for depreciation) is simply divided by its estimated average remaining life to arrive at the dollars to be recouped each year. This expense is then divided by the gross plant to arrive at the depreciation rate. Another way of looking at this method is to divide the ratio of the net plant in service and the gross plant in service by the average remaining life to arrive at the percentage of plant that must be recovered each year, which is the same as the depreciation rate. These calculations are shown for Storage and Onshore Transmission plant at the bottom of Exhibit Nos. S-17, Page 3, and S-18, Page 3, and are labeled Base Rate Derivation.

Q. Please describe Page 3 of Exhibit Nos. S-17 and S-18.

A. Page 3 of both Exhibit Nos. S-17 and S-18 shows the calculation of the composite depreciation rate for the

Storage and Onshore Transmission plants. It includes the existing gross depreciable plant in service and a depreciation rate appropriate to recoup the existing net plant over its average remaining life and the near term plant additions along with an appropriate depreciation rate for each vintage year of additions. The existing net plant is divided by 23 years to arrive at the base depreciation rate, that is, the rate that will recoup the existing plant in service over its useful life. The 23 years is the estimated average remaining life of the plant in operation today.

Average Remaining Life

Q. Why is the average remaining life of the existing plant 23 years when you have stated that the total remaining life of the system is approximately 25 years?

A. All of NGPL's depreciable property in use today will not survive until 2018 (1993 + 25 years). Some of today's plant can be expected to be retired, for any number of reasons, between now and 2018; therefore, the average life expectancy of NGPL's existing facilities must be somewhat shorter than 25 years. In depreciation studies using the average remaining life method, an attempt is made to estimate that shorter life expectancy by examining the history of plant additions and retirements to find the underlying pattern of plant mortality which gives rise to the interim retirements expected to take place between the study date and the last year of company operations. My estimate of those interim retirements indicates a shortening of the remaining economic life from 25 years to an average of 23 years.

Q. How did you make those estimates?

A. My estimate of a reduction in the average remaining life of approximately two years is based on the average age of the existing Storage and Transmission plant for NGPL, which is in the neighborhood of 19 years. This estimate is the composite average age of the vintaged plant balances for the major accounts in each function. The vintaged plant balance is the plant dollars remaining from each vintage of plant additions going back to the early 1950's for Storage and the early 1930's for Transmission. Although the oldest plant was put in service sometime in the 1930's, the overwhelming weight of the dollars were invested in the last twenty years, with approximately one third the existing plant put in service in the late 1970's and early 1980's. A calculation of the average age of plant is shown on Exhibit No. S-17, Page 1 for Storage and Exhibit No. S-18, Page 1 for Transmission.

Q. Please explain how Exhibit No. S-17, Page 2, and Exhibit No. S-18, Page 2, utilize these average age estimates.

A. Page 2 of both Exhibit Nos. S-17 and S-18 works through the calculations of the survivor curve analysis for Storage and Transmission plant to arrive at the average remaining life given the current age of the plant in service. (A survivor curve is the mathmatical representation of the pattern of retirements for dollars invested in plant and equipment. It estimates the amount of plant remaining in service at any given time from each vintage of plant additions.) I will use the Transmission plant calculation on Exhibit No. S-18, Page 2, as an example. The determination of the average remaining life is a three step process. First, I determined the remaining physical life of today's plant in the year 1993. Second, I determined the remaining physical life of today's plant in the year 2018. Third, I calculate the difference between the two life estimates to reveal the average remaining life.

Q. Explain how you derived the remaining physical life of existing plant in the first step.

A. Given that the average age is 19.5 years (from Exhibit No. S-18, Page 1) and the average service life of Storage and Transmission plant should be in the neighborhood of 65 years, survivor curve analysis indicates that today's plant would have an average remaining physical service life of 48 years. As shown on the worksheets of Exhibit No. S-18, Page 2, 19.5 years is 30 percent of the average service life. Based on standard survivor curve formulas, at 30 percent of the average service life, one would expect 95.26 percent of the plant to still be in service. As plant investment is retired over the years, the plant remaining is, in a sense, would then have a probable life of 114 percent of the average life. The probable total life span for that more durable plant would be 74 years and the remaining physical life for the 44.5 year old plant would then be 29.5 years.

Q. Explain how you derived the average remaining economic life in the third step.

A. I have calculated the average remaining physical life at two points in time for NGPL's plant, 1993 and 2018. Simply subtracting the two, however, will not reveal the average life span between the two points. The life span estimates are greatly influenced by the amount of plant in service at the beginning of the two periods. Therefore, I have calculated "the area under the curve" for both survivor curves to arrive at comparable quantities.

Calculating the effect of interim retirements on existing plant, the 48 years remaining for that plant results in an "area under the curve" of 45.89 "survivor units" for the plant in service today. This figure represents the idea that only some of the 95.26 percent of the plant now surviving from the original installation would survive the remaining 48 years.

Again calculating the effect of interim retirements on the 80% of plant remaining in the year 2018 results in an "area under the curve" of 23.7 survivor units. As mentioned above, this figure represents the idea that only some of the

80 percent of the plant then surviving from the original installation would survive the then remaining 29.5 years.

Subtracting the areas under the curves from the two studies (45.89 - 23.70 = 22.19) results in a figure representing the change in surviving plant balances between the study periods. Dividing this 22.19 figure by the 95.26 percent of plant surviving at the beginning of this study (1993) results in an average remaining life estimate of 23.3 years, a reduction of 1.7 years from the remaining useful life estimate.

Gas Supply Forecast

Q. You stated earlier that you used a 25 year economic life expectancy, upon what are you basing that estimate?

A. My estimate of the life expectancies for the physical plant of the NGPL system is based on the long term general supply of natural gas in the United States. NGPL is a major pipeline system, connected to the major natural gas producing regions of the country. I have relied on the reports by the Department of Energy and the National Petroleum Council for their estimates of long term natural gas production and proved and potential natural gas reserves. I will discuss long term production first and then reserves.

Q. On what do you rely for your assumption that there will be gas production available in the year 2018?

A. The Department of Energy's Energy Information Administration's <u>Annual Energy Outlook</u> for 1993 presents the long term projections for energy supply and demand out to the year 2010. The figures for the "Reference Case" model indicate a domestic natural gas production level of 17.81 Trillion Cubic Feet (TCF) in 1990, rising to 20.65 TCF in 2005 and easing off to 20.07 TCF by 2010. Net imports of natural gas are expected to rise from 1.45 TCF in 1990 to 4.15 TCF in 2010. On the demand side, consumption of natural gas is expected to rise by 1.3% annually from a level of 18.73 TCF in 1990 to a level of 24.24 TCF by 2010. These figures are reproduced on Exhibit No. S-19, Page 1.

Q. How do these figures compare with other long term forecasts?

A. DOE's forecast falls within the range of forecasts put out by other natural gas analysis groups. As shown on Exhibit No. S-19, Page 2, DOE's forecast of 20.1 TCF by 2010 is below that of The WEFA Group, Gas Research Institute, and American Gas Association's, but just above that of DRI/McGraw-Hill's.

Q. What do these figures tell you?

A. These figures tell me that domestic production of natural gas is expected to grow until approximately the year 2005 when it peaks at 29.65 TCF per year (under the Reference Case scenario), and then taper off. Because NGPL or its shippers are capable of obtaining gas reserves from any of the major production areas, their potential gas supply should be correlated to that of the whole United States. NGPL's customers can buy gas almost anywhere in the U.S. and have it shipped to their markets via NGPL. Although the forecasts only go to the year 2010, there is no indication that the supply and demand for gas will drop significantly in the ensuing decade. With natural gas production and demand levels remaining near the 20 TCF mark and NGPL able to reach into any of those supply markets, I see no reason why the NGPL physical Storage and Onshore Transmission plant should not remain used and useful out to <u>at least</u> the year 2018.

Q. What does the National Petroleum Council estimate for proven and potential gas reserves?

A. The National Petroleum Council (NPC) has estimated existing proved reserves to be 160 Trillion Cubic Feet (TCF) and has estimated potential reserves to be 559 TCF. The 559 TCF comes from growth in existing reserves and new field discoveries using existing technology. NPC has estimated greater potential reserves from other sources, as shown on Exhibit No. S-19, Page 3, however, I have chosen to include only potential reserves from conventional sources using current technology. For informational purposes, I have included the NPC's comparison of its proved and potential gas reserves estimate with other major forecasting organizations on my Exhibit No. S-19, Page 4.

Q. How does NGPL's Resource Area compare to the total U.S.?

A. NGPL's gas supply Resource Area covers a wide swath of the gas producing regions of the country, as indicated by the map in Mr. Grinnell's testimony, Exhibit No.___(BMG-2). I have examined the proved gas reserve estimates and production from those regions over the last five years as compared to the total U.S. gas reserves and production. As can be seen on my Exhibit No. S-19, Page 5, proved reserves in the NGPL Resource Area are experiencing a decline as a percentage of total U.S. proved reserves from 82% to 77%, with a five year average of approximately 80% of the total U.S. proved gas reserves. Production from NGPL's Resource Area as a percent of the total U.S. production has remained fairly consistent in the mid eighty percent range.

Q. How does all this affect NGPL's long term gas supply?

A. I have brought together these various reserve and production estimates on Exhibit No. S-19, Page 6, to show NGPL's share of reserves and production over the long term. I have applied the 75% share of gas reserves to the NPC's estimate of proved and potential gas reserves to arrive at the total gas reserves available in NGPL's Resource Area. NGPL's Resource Area should contain approximately 539 TCF out of a U.S. total of 559 TCF proved and potential gas reserves. Again, this is a conservative estimate which excludes reserves from tight sands, coal gas, and other unconventional sources. It also excludes reserves brought on through advancing technology. I have applied the 85% share of production to the DOE estimate of long term domestic gas production to arrive at NGPL's Resource Area's long term annual throughput. To that 85%, I have applied NGPL's 10% share to arrive at NGPL's long term annual throughput. Rather than experiencing a declining throughput as estimated by Mr. Simmons, NGPL's share of long term production should remain in the 1500 to 1800 BCF range for many years.

Q. How does your reliance on long term gas supply differ from NGPL's reliance on its long term gas supply forecast?

A. My reliance on long term gas supply is limited to demonstrating that sufficient supplies exist to provide NGPL's plant in service with a used and useful life out to at least the year 2018. The depreciation rates I recommend are not dependent on the pattern of that long term production. Furthermore, the long term forecast indictates that the pattern of production should not have a significant effect on the depreciation accruals. NGPL's rates, however, are dependent on both the total volume of future throughput and the pattern of that throughput. The UOP methodology very sensitive to those volume estimates when there is a forecast of declining throughput. As I will demonstrate later, a corrected gas supply picture reveals drastically different depreciation rates. The effect of this corrected gas supply picture can be seen on my Exhibit No. S-22. Where Mr. Simmons' UOP calculations brought in depreciation rates of 2.75% and 3.50% for the first year, a corrected gas reserves estimate reveals a depreciation rate of 1.20% for the first year.

Plant Additions

Q. How have you incorporated future plant additions?

A. In my calculation of appropriate depreciation rates, I have included an estimate of the plant additions for the near term future so that the rates will be applicable to the plant in service over the period for which the rates are designed. Recent Transmission plant additions have ranged from $27 million to $170 million per year. I have accepted NGPL's forecast of Transmission plant near term annual additions at the $75,000,000 per year level. NGPL did not provide separate estimates of near term plant additions for the other functions. Recent normal Storage plant additions have ranged from one to three million dollars per year with a 1991 addition of twenty million way outside the normal range. I have assumed a level of approximately $2,500,000 per year for Storage plant.

Q. How did you arrive at the depreciation rates to apply to these near term plant additions?

A. The rates for the near term plant additions are based on the anticipated useful life of those additions. Given that my analysis is based on a total remaining useful life of 25 years for NGPL's operations, the first year's additions to plant would be expected to be used and useful for the whole 25 years, 1993 to 2018; therefore the depreciation rate for those first year addition facilities is 1/25 or 4.00%. The useful life of the second year's plant addition would be expected to be only 24 years, that is 1994 to 2018, therefore its depreciation rate is 1/24 or 4.17%. Finally, the third year's addition would be expected to last 23 years, so its depreciation rate is 1/23 or 4.35%. These rates are designed, of course, for plant that has not yet been built or put into service and so has not been depreciated at all.

Q. How did you composite these various rates?

A. As shown on Exhibits Nos. S-17, page 3, and S-18, page 3, the sum of the depreciation expenses for all three years' existing plant and future plant addditions was divided by the sum of the depreciable plants for each year to arrive at the composite depreciation rate.

Q. What composite depreciation rates are you recommending for each function?

A. I am recommending a composite depreciation rate for

Storage plant at 1.90%, and

Onshore Transmission plant at 1.70%.

NGPL's Depreciation Methodology

Q. What depreciation methodology has NGPL proposed?

A. NGPL has offered three calculations to support its proposed depreciation rates. These calculations purport to use exhaustion of the underlying resource as their principle factor. Mr. Simmons has offered two unit-of-production studies and one "life of the gas reserves" study. These studies are seriously flawed and must be rejected as the basis for deriving the proper depreciation rates for NGPL's facilities.

Q. Please describe Mr. Simmons' first and second studies.

A. Mr. Simmons' first study, shown on Exhibit No. ___(GES-3), is a unit-of-production study whose basic feature is the addition of future gas reserves as they "come on line." Mr. Simmons' second study, shown on Exhibit No. ___(GES-4), is a unit-of-production study whose basic feature is the addition of future gas reserves "up front".

The UOP Method

Q. How are these two studies flawed?

A. The greatest flaw in these studies is that the unit-of-production method is the wrong method altogether for mainline Storage and Transmission plant. The UOP method is intended for plant whose remaining useful life is heavily influenced by the changes in volumes flowing through the facilities. It is historically used for plant connected to producing areas where the throughput has an extremely high probability of showing high volumes in the early years and drastically reduced volumes in the later years, such as Production plant and Offshore Transmission plant. In such an instance, depreciating the facility evenly over the number of producing years would result in low per-unit costs in the early years and quite high per-unit costs in the later years. The resulting spread of costs between generations of rate payers is unfair and unreasonable.

Q. Why is the use of the unit-of-production method unfair in spreading the cost of mainline plant?

A. NGPL's mainline plant is connected to numerous gas producing areas and as such has no definitive decline curve associated with its long term gas supply. In fact, based on the long term projections discussed earlier, it is quite likely that throughput on NGPL's mainline plant will <u>increase</u> over the next decade or so, rather than drastically decrease, as indicated by Mr. Simmons' depreciation workpapers. With domestic production of natural gas supplies increasing, as forecasted by DOE and the other major forecasting organizations, unless NGPL's <u>share</u> of that production falls off for some reason, NGPL's transmission of the gas through its mainline plant can be expected to increase as well. The use of UOP methodology incorporating a declining resource base, when in fact the resource base is holding steady or increasing, results in an unfair and unreasonable burden on the near term customers. As shown on page 2 of both Exhibit Nos. S-20 and S-21, Column 10, near term customers pay a substantially higher depreciation rate than do customers several years in the future, even though those future customers may very well use the system just as intensely as today's customers. (The slight increases in the years 1994 through 1996 reflect near term plant additions.) These rates should be contrasted with Exhibit No. S-22 which shows the corrected gas reserve and production estimates.

Q. Why must the future gas reserves be included in the beginning of the calculations?

A. A UOP calculation is intended to measure the life of today's plant by dividing the investment dollars by the total amount of gas reserves that will flow through the facilities. By holding off some reserves to add on "as discovered" later, the total reserve estimate for today's plant is under-counted. The under-counting results in a higher depreciation rate and an over-collection of depreciation expense paid for by today's customers. While those reserves may not be discovered and flowed through the facilities until later, sometimes much later, they <u>will</u> flow through today's facilities. Therefore, the actual flows for near term throughput represent a smaller proportion of the total throughput over the life of the facilities. If the proportion of total flow is smaller, the proportion of depreciation expense should also be smaller.

Other Flaws

Q. What are the other flaws you found in Mr. Simmons' studies?

A. Mr. Simmons has misapplied the UOP methodology in several respects. Foremost among these is the under-estimation of gas reserves. In the derivation of NGPL's depreciation rates, Mr. Simmons has shortchanged the gas reserve estimates in two ways, and thus arrived at depreciation rates far outside the zone of reasonableness. First, his estimate of future gas reserve additions is way below any reasonable estimate. Second, his calculations use only half the total gas reserve estimates to derive a depreciation rate. In addition, Mr. Simmons has rolled together of all production and gathering plant, Onshore Transmission plant, and Offshore Transmission plant in one depreciation calculation. Finally, Mr. Simmons has included an "average annual" calculation which artificially boosts depreciation rates in the later years.

Under-estimation of Gas Reserves

Q. How has Mr. Simmons under-estimated future gas reserve additions?

A. The estimate of gas reserves from which future production will be drawn is made up of two categories of gas reserves: existing proven reserves and future potential reserves. The potential reserves are as yet undiscovered. These undiscovered reserves, however, will flow through today's facilities in the years to come and therefore they must be added to the estimate of the useful life of the facilities - the gas reserve estimate. The first major flaw in Mr. Simmons' application of a UOP methodology involves the estimate of these future discoveries. Mr. Simmons greatly under-estimates the gas reserve additions from future discoveries by relying on Mr. Grinnell's gas supply study. Staff witness Mr. Feinstein will discuss the failings of Mr. Grinnell's gas reserve estimates. As can be noted from my earlier discussion and accompanying exhibits, NGPL's gas reserves are considerably greater than the figure Mr. Simmons has used. Where Mr. Simmons has incorporated a gas reserve estimate of only 11,918.8 BCF in his UOP calculations, I have estimated 40,610.6 BCF.

Depreciation "Half-Life"

Q. How else has Mr. Simmons under-estimated total gas reserves?

A. The second major flaw in Mr. Simmons' application of the UOP methodology is the use of only ten years of the total gas reserves to derive his depreciation rate. A proper UOP study is supposed to include all the gas reserves expected to flow through the facilities. Mr. Simmons' studies have used only half the already drastically under-estimated reserve estimates that should be used in the depreciation calculations, if one accepted Mr. Grinnell's study. Although Mr. Grinnell has supplied Mr. Simmons with estimates of production from existing and future gas reserves out to the year 2016 (see Grinnell's Exhibit No.___(BMG-3), Mr. Simmons has chosen to include only the production out to the year 2002. As shown column 3 of Simmons' Exhibit Nos. ___(GES-3) and ___(GES-4), NGPL's share of the future reserve additions incorporated into the depreciation calculations include only 3,727 BCF of the 8,723 BCF total from Column 6 of Exhibit No.___(GES-7). The impact of this halving is that today's customers shoulder a greater share of the depreciation accruals than they should.

NGPL's Share of Gas Reserves

Q. How has Mr. Simmons estimated NGPL's share of existing and future production?

A. In calculating NGPL's share of production from existing and future gas reserves, Mr. Simmons has taken NGPL's share of 1993 production in its resource base areas. As noted by Mr. Simmons' on page 16 of his direct testimony, Exhibit No. ___(GES-1), he has derived his share factor by dividing NGPL's 1993 projected deliverability by the supply areas' 1993 averaged production (the average of the high and low case scenarios). His resulting share factor is 10.74%. I have reviewed this estimate and adjusted it to 10%. NGPL's share of its Resource Area production is shown on my Exhibit No. S-19, Page 7. I have incorporated this 10% figure into the NGPL share of future gas production on Exhibit No. S-19, Page 6, and extrapolated these estimates for the UOP calculation on Exhibit No. S-22, column 4.

Extension of Simmons' UOP Models

Q. Have you examined the effect of these under-estimations?

A. Yes. On page 2 of both Exhibit Nos. S-20 and S-21, I have taken Mr. Simmons' models and extended them to the year 2016 to show the effects of under-estimation of gas reserves. Exhibit No. S-20 relates to Mr. Simmons' "as discovered" model which incorporates future reserve additions in the year they come on line. Exhibit No. S-21 relates to Mr. Simmons' "front loaded" model which incorporates future additions in the first year. On Exhibit Nos. S-20, Page 2, and S-21, Page 2, I show the extended version of Mr. Simmons' "average annual" models. The extended version uses the same gas reserve estimates and future additions cut off date but continues the calculations out to the year 2016. Exhibit No. S-22 shows the UOP method with a corrected gas reserve estimate and the full 25 years of gas supply. It also removes the "average annual" technique but continues the rolled-together treatment for all non-Storage plant.

Q. What do Exhibits Nos. S-20 and S-21 show?

A. Page 2 of Exhibit Nos. S-20 and S-21 show that Mr. Simmons' methods would over-accrue the depreciation component of the easily made, the depreciation rate no longer truly reflects the characteristics of the function that give rise to varying life expectancies.

Critique of "Average Annual" Technique

Q. What is the "average annual" technique?

A. Mr. Simmons' "average annual" technique is a averaging method which rolls each successive annual estimate into the average. A simple average would take the total of all the annual figures and divide by the number of years. A rolling average would take the total of, say, three years and divide by three and then roll down the line adding each successive new year and dropping the oldest year. The "average annual" does not drop the oldest years as it moves along. In this case, the oldest years are the high cost years, so the average doesn't gain the full advantage of declining costs in the latter years as does the rolling average technique.

Q. Why do you object to the calculating of "average annual" depreciation expense and depreciable plant?

A. Mr. Simmons' average annual technique calculates the depreciation rate in a three step process. First, he calculates the depreciation expense based on a normal UOP methodology, i.e., he multiplies the net plant by the production-to-reserves ratio (P/R). Second, he calculates a cascading average of the UOP derived depreciation expenses wherein each successive averaged expense is the average of all the preceding years' expenses. Third, he divides these averaged expenses by the averaged depreciable plant to arrive at a depreciation rate for each year. My objection to this method is that in averaging all the preceding years' depreciation expenses, each individual year's average includes only the higher costs of the previous years. In the later years, the low costs that should be the result of a UOP methodology are negated by the inclusion in the averaging of all the high cost early years. In contrast, the near term customers are treated unfairly because the average never includes the low cost years to come.

Q. Can you demonstrate this effect?

A. Yes. I have reproduced Mr. Simmons' studies on page 1 of both Exhibit Nos. S-20 and S-21. On each exhibit, I show Mr. Simmons' "average annual" calculations and a normal UOP calculation using the same gas reserve estimates and future reserve additions cut off dates. The normal UOP method shows a more rapid decline in depreciation rates than does the "average annual" method. Furthermore, as shown on the extended versions of these methods, page 2 of Exhibit Nos. S-20 and Exhibit No. S-21, they even continue to generate depreciation rates past the year 2010 even though the plant has been fully recovered by his method. While this method does hold depreciation rates slightly lower in the early years than does the normal UOP method, it keeps the rates much higher than they should be in the later years.

Q. Having corrected the UOP calculations in Mr. Simmons' "as discovered" and "front loaded" models, would you recommend the resulting depreciation rates?

A. No. Even as corrected, I do not recommend the use of UOP depreciation methodology for mainline transmission plant or storage plant. The life expectancies of such plant is not tied to the production from any particular field. Furthermore, the long term forecasts for domestic production, as discussed earlier, indicate that gas reserve additions and production will be increasing for at least the next decade. Mr. Simmons' studies presume falling production and, therefore, higher near term depreciation rates. With long term production expected to remain steady or increasing, the depreciation rates for mainline plant should be steady or declining.

Critique of "life of the reserves" technique

Q. Please describe Mr. Simmons' third depreciation study.

A. Mr. Simmons' third study claims to be a "average remaining life of forecasted gas supply" analysis. While purporting to weigh the remaining life of the physical plant by the remaining throughput, it in fact weighs the years of production, not the production itself. Mr. Simmons method is in fact a "weighing of the years" calculations. This is not a depreciation methodology and has nothing to do with depreciation. It is a mathematical calculation which bears

Thus with each recalculation, every production estimate has a one year shorter life expectancy.

Q. Does Mr. Simmons explain in terms of depreciation theory why the average remaining life (ARL) method should be applied to gas supplies rather than to the physical plant?

A. No, he does not. Although he notes that the ARL method is a sound means of deriving a depreciation rate (page 22 of his direct testimony Exhibit No.___(GES-1)) and he notes that exhaustion of reserves is the basis for the life estimate, he does not relate these principles to the methodology he employed. In fact, he admits on page 23 that the gas supply will not become exhausted for "many years" after the average life is reached. Yet he uses a methodology which totally ignores and excludes those many years from from the calculations.

Q. Why do you disagree with this method?

A. I disagree with this method because it does not accurately reflect the useful life of the transmission plant or the underlying gas supplies. This method results in a depreciation rate which recovers the full depreciable plant in less than half the remaining useful life, resulting in a much higher depreciation rate than is appropriate. Mr. Simmons' Exhibit No. ___(GES-8) clearly shows production out to the year 2016, yet the method conjures up a depreciation rate on Exhibit No. ___(GES-5) which will fully recovers the plant in a little over 9 years.

Q. Why doesn't this weighing accurately reflect the useful life of gas supplies or the gas plant in service?

A. While the method does calculate the average remaining life of gas supplies, it does not measure the remaining useful life of the plant in service. This is clearly seen in the example I have constructed on Exhibit No. S-23. In Exhibit No. S-23, I have assumed a 25 year supply of gas produced at 1,000 units per year. The plant in service will be used in exactly the same manner every year for 25 years, carrying exactly the same level of volumes every year for 25 years. Obviously, the useful life of the facilities is 25 years, yet the average life of the gas supply is only 12.5 years. The gas supply may have an average life of 12 years but its useful life is clearly 25 years. A depreciation rate based on the average life of gas reserves will fully recover the plant in 12.5 years. Mr. Simmons' use of this method simply aggravates its inherent flaws. His gas supply is again under-estimated and shows dwindling production as the years progress. The weighing technique puts a heavier weighting on the years further out which, by Mr. Simmons gas production forecast, carries far fewer volumes. Thus this method reflects an even shorter average life of gas supplies and comes up with an even shorter depreciable life. Even if gas supplies hold steady or increase, as indicated by the long term gas supply forecasts discussed earlier, Mr.

Simmons' method would still result in a depreciation rate which recovers the plant in only half its useful life.

Q. Doesn't the method show a declining depreciation rate as the years go by?

A. The calculations show a declining rate but the depreciation rate which NGPL will actually use will be a set rate which will not change until the next rate case. Thus the high gets locked in for possibly several years (NGPL's last rate filing was five years ago). NGPL's depreciation rates do not ratchet down automatically and by the time the rates are adjusted, today's customers will have overpaid their fair share of depreciation accruals. Just as with Mr. Simmons' other methods, today's customers' money will be gone and the benefits will accrue to those still on line several years down the road. No matter how you manipulate the calculations, the bottom line is still reflected in the figures on Exhibit No. S-16. NGPL's proposed rates will recover the plant at a much faster rate than the rates indicated by long term production forecasts.

Storage Plant Depreciation Rates

Q. Why do you disagree with Mr. Simmons' Storage plant depreciation proposal?

A. Again it is a simple matter of the bottom line. Mr. Simmons proposes to depreciate the Storage plant over an 11.6 year life despite the fact that the plant has at least a 25 year remaining useful life. I agree with Mr. Simmons' basic premise that the Storage and Onshore Transmission plant should have the same depreciable life span, but that life span should reflect the useful life of the facilities not the half-life of the average remaining life of gas supplies. The various plant functions wind up with differing depreciation rates because of the differences in plant additions and retirements, even when the life span estimates are the same. Mr. Simmons uses an unreasonable life span and thus ends up with an unreasonable depreciation rate. My calculations on Exhibit No. S-17 accurately reflect the average remaining useful life of the Storage facilities (rather than the gas supply) and the appropriate depreciation rate to allocate fair shares of depreciation expense among the generations of users of those facilities.

Account No. 858

Q. What cost level has NGPL proposed for Account No. 858?

A. On Schedule No. I-4 of NGPL's filing, NGPL has shown a cost level for Account No. 858 of approximately $88.6 million to reflect transportation charges from other pipelines.

Q. What have you recommended as the appropriate cost level in this case?

A. I have recommended an annualized cost level of approximately $70.8 million for the locked in period June 1, 1993, to November 30, 1993. For the post-restructuring period beginning December 1, 1993, I have accepted the costs as reflected in Mr. Harrington's Exhibit No.___(RFH-6) as $55.1 million.

Q. What caused you to adjust NGPL's proposed cost level for the pre-restructuring period?

A. NGPL's filing reflected transportation charges from numerous pipelines based on projected volumes and transportation rates. I have accepted NGPL's throughput estimates for Account No. 858 but made number of adjustments to various transportation rates.

Q. Why have you accepted NGPL's throughput estimates for the pre-restructuring period?

A. NGPL's test period throughput estimates reflect adjustments to Account No. 858 contracts to account for the termination of several agreements, the consolidation of some firm agreements into interruptible agreements, the move from higher cost contracts to lower cost contracts, and the adjustment of volumes under some other contracts. Overall NGPL has reduced the Account No. 858 volumes by approximately half.

Q. Why have you adjusted the transportation rates used in calculating Account No. 858 costs for the pre-restructuring period?

A. My adjustments are based on the fact that some of the filed rates reflect post-restructuring transportation rates (on the upstream lines) for volumes moved in the precontract costs as of December 1, 1993. (An exception was made for the volumes associated with Western Gas Marketing, Great Lakes, and ANR to be included in the base rates.) The initial level of costs to be tracked in the surcharge is to be determined in a separate filing under section 4 of the NGA and to be collected through a surcharge on the transportation rates. NGPL has made that filing in Docket No. RP94-86-000 and has filed a revised surcharge in RP94-179-000. NGPL also made a companion filing in RP93-36-007 to reflect the revised Account No. 858 costs and billing determinants resulting from the restructuring orders. The RP93-36-007 filing was rejected.

Q. When does the post-restructuring Account No. 858 tracking begin?

A. The Commission's restructuring order required NGPL, as reflected in Section 21 of its General Terms & Conditions, to remove from its initial base rates all Account No. 858 costs. The orders provided NGPL the opportunity to file a separate section 4 filing to recover the Account No. 858 costs and to be effective December 1, 1993. However, the filings in this regard made by NGPL have requested an effective date of January 1, 1994. The Commission has accepted the January 1, 1994, effective date subject to refunds. Therefore, while NGPL was allowed to begin tracking those costs on December 1, 1993, by its own request it will begin January 1, 1994.

Q. What have you recommended for the post-December 1, 1993, Account No. 858 costs?
A. I recommend that the base rates include Account No. 858 costs after December 1, 1993, associated only with Western Gas Marketing and the related capacity rights on ANR and Great Lakes as provided in Section 3.7(a) of NGPL's tariff. As identified by Mr. Harrington, those costs amount to approximately $55 million. All other appropriate Account No. 858 costs will be identified and recovered through the separate surcharge filings made pursuant to the provisions of Section 21 of the tariff.

Account No. 824

Q. Have you examined the Account No. 824 costs arising out of the storage contracts NGPL has with ANR?
A. Yes. NGPL has proposed a test period Account No. 824 cost level of $27.6 million. Its base period cost level was $21.4 million. I am recommending a cost level of $25.5 million.
Q. How did you arrive at your estimate of those Account No. 824 costs?
A. NGPL responded to a data request of Peoples Gas Light & Coke/NI-Gas (Item # 20) by indicating the volumes associated with the MS-1 and MS-2 services which correspond to the ANR X-60 and X-14 contracts. To these volumes I have applied the ANR rates in effect on November 1, 1992. NGPL had used

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Re: Natural Gas Pipeline Company of America
Docket No. RP93-36-000

Affidavit

Patrick R. Crowley, being first duly sworn, on oath states that he is the Patrick R. Crowley whose prepared direct testimony entitled PREPARED DIRECT TESTIMONY OF PATRICK R. CROWLEY was served on all parties to the above referenced proceeding. Patrick R. Crowley further states that if asked the questions contained in the text of such testimony he would give the answers that are therein set forth and that he adopts the aforesaid answers as his direct testimony in this proceeding.

Patrick R. Crowley

Patrick R. Crowley

District of Columbia

Sworn To and Subscribed Before Me

this 28th day of March, 1994

Notary Public

My Commission Expires November 14, 1994