DIRECT TESTIMONY

OF

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Engineering Department

Energy Division

Illinois Commerce Commission

Northern Illinois Gas Company

d/b/a Nicor Gas Company

Proposed General Increase in Gas Rates

Docket No. 08-0363

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Q. Please state your name and business address.

A. My name is Dennis L. Anderson, and my business address is 527 East Capitol Avenue, Springfield, Illinois 62701.

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

A. I am employed by the Illinois Commerce Commission ("Commission") as a Senior Energy Engineer in the Gas Section of the Engineering Department of the Energy Division.

Q. Please state your educational background and work experience.

A. I received a Bachelor of Science degree in Civil Engineering from Iowa State University in 1967. In 1979, I received a Master of Business Administration degree from Illinois State University. I am a registered Professional Engineer in the State of Illinois.

After receiving my engineering degree, I was employed by Illinois Power Company in 1967. I worked for Illinois Power Company a total of 33 years in various engineering, operating, supervisory, and managerial capacities, primarily related to the design, construction, and operation of natural gas distribution, transmission, underground storage, and peak shaving plants. I retired from Illinois Power Company in April of 2000 and joined the Commission in July of 2000.

Q. What are your primary responsibilities and duties as a Senior Energy Engineer in the Gas Section of the Energy Division's Engineering Department?

A. My primary responsibilities and duties are in the performance of studies and analyses dealing with day-to-day, and long-term, operations and planning for the gas utilities serving Illinois. For example, I review purchased gas adjustment clause ("PGA") reconciliations, rate base additions, levels of natural gas used for working capital, and utility applications for Certificates of Public Convenience and Necessity. I also perform gas meter audits.

Q. What is the purpose of these proceedings?

A. On June 6, 2008, Northern Illinois Gas, d/b/a Nicor Gas Company ("Nicor Gas" or "Company"), filed tariffs that requested Commission approval to increase natural gas rates.

Q. What is your assignment in this proceeding?

A. My assignment is to review from an engineering perspective the Company's request for Rider 30, Qualifying Infrastructure Plant ("Rider QIP") to cover investment with regard to pipe and service replacement. I also discuss from an engineering perspective the Company's methodology for handling adjustments to its gas storage fields to compensate for physical losses and the performance deterioration of the field through a 2% storage adjustment factor applied to all withdrawals from storage.

Q. Are you making any monetary recommendations in this proceeding?

A. No. Staff witness Dianna Hathhorn discusses the accounting issues related to storage field adjustments in ICC Staff Exhibit 2.0.

Q. What is your overall conclusion?

A. I determined that the Company has failed to demonstrate a need to drastically increase its replacement of cast iron main and copper services as it proposes.

I recommend that Nicor Gas provide details regarding how it determined the 2% storage adjustment factor that it applies to all volumes withdrawn from its on-system storage fields as well as provide further information regarding how it allocates this factor among the users of its on-system storage system.

I also determined, from an engineering perspective, that Nicor Gas' methodology of adjusting storage field inventories for physical gas losses and for the deterioration of storage field performance over time does not adequately reflect what was actually occurring at its storage fields. I recommend Nicor Gas develop a methodology for recognizing adjustments to storage field inventories that reflect and distinguish between physical losses from storage versus those necessary adjustments related to the deterioration of storage field performance over time resulting from the migration of working inventory to base gas.

Capital Investment Cost Recovery Rider ("Rider QIP")

Q. What capital replacement projects is Nicor Gas proposing to be included in its proposed Rider QIP?

A. Nicor Gas is proposing to include an accelerated replacement program for cast iron main and copper services in its proposed Rider QIP.

Q. What approach has Nicor Gas historically used for its replacing cast iron main and copper services?

A. Company witness McCain (Co. Ex. 5.0, pp. 7 and 8) states the Company uses a process for replacing cast iron main and copper services that is intended to cost-effectively balance the need to replace aging facilities where indications point to declining performance with the practical limitation of available capital. Company witness O'Connor (Co. Ex. 12.0, p. 29) states the Company "…utilizes a risk-based approach to prioritize the replacement of its cast iron main and copper services." Witness McCain further states, "Historically, Nicor Gas has replaced these materials at a rate determined by the performance of the pipes, and its efforts have been successful – the Company has maintained a safe and reliable system for our customers." (Co. Ex. 5.0, p. 9)

Q. What have been the results from Nicor Gas' replacement program for cast iron mains and copper services over the three year period 2005 to 2007?

A. Witness McCain (Co. Ex. 5.0, p. 10) states that the Company has averaged replacing approximately 15 miles of cast iron main and 3,500 copper services per year over the three year period 2005 to 2007. Witness O'Connor states, "At this replacement rate, it would take until 2040, or approximately 32 years to complete the replacement of all cast iron main and copper services in the Company's system." (Co. Ex. 12.0, p. 5)

Q. What is Nicor Gas proposing for a cast iron main and copper service replacement program for 2008 and 2009?

A. Witness O'Connor (Co. Ex. 12.0, p. 5) states, "For 2008 and 2009, the Company will replace approximately 40 miles of cast iron main and 9,000 copper services each year." Witness O'Connor further states, "Subject to receiving approval of its Rider QIP, the Company is proposing to continue its accelerated replacement of these facilities so that all cast iron main and copper services would be replaced within ten years." (Co. Ex. 12.0, pp. 29-30)

Q. Could Nicor Gas have accelerated its cast iron main and copper service replacement program prior to its filing this rate case?

A. Yes.

Q. What is your opinion on Nicor Gas' plan to accelerate its replacement of cast iron main and copper services?

A. Nicor Gas has failed to demonstrate that the performance of its cast iron main and copper services justifies an accelerated replacement program. Witness McCain states (Co. Ex. 5.0, p. 9), "Historically, Nicor Gas has replaced these materials at a rate determined by the performance of the pipes, and its efforts have been successful-the Company has maintained a safe and reliable system for our customers." I believe the decision to accelerate the replacement of cast iron main and copper services should be based on the condition of the facilities and the need for Nicor Gas to continue to operate a safe and reliable natural gas system.

Q. What rationale did the Company provide for accelerating its cast iron main and copper service replacements in 2008 and 2009?

A. Company witnesses McCain (Co. Ex. 5.0, pp. 8-11) and O'Connor (Co. Ex. 12.0, pp. 28-34) discuss Nicor Gas' rationale for accelerating its cast iron main and copper service replacements. The rationale discussed includes safety, reliability, efficiency, customer satisfaction, reduced operation and maintenance costs, balanced work load, and a lower overall capital cost to complete the total replacement. Additionally, Mr. McCain also notes that "The performance of the cast iron and copper materials continues to decline as the Company's infrastructure continues to age. An acceleration of pipe replacement would allow the Company to make replacements on a level to better keep pace with, or even move ahead of, the declining performance of the materials." (Co. Ex. 5.0, p. 9)

Q. Did Nicor Gas provide an overall quantification of the benefits or effects on safety, reliability, efficiency, customer satisfaction, reduced operation and maintenance costs, balanced work load, and a lower overall capital cost to complete the total replacement from the proposed accelerated replacement program?

A. No.

Q. Do you disagree with Nicor Gas' rationale for wanting to accelerate the replacement of its cast iron mains and copper services?

A. No. However, Nicor Gas is merely stating the obvious; if cast iron main and copper services are not replaced before their performance declines, then Nicor Gas' system could see problems with the safety, reliability, and efficiency of its system. Nevertheless, the Company has not provided any independent evidence to support its proposed accelerated replacement program. As Nicor Gas indicated, it has maintained a safe and reliable system with its historic replacement schedule.

Q. From an engineering perspective do you believe an accelerated replacement of cast iron main and copper services in the Nicor Gas system is justified?

A. No. Nicor Gas has not demonstrated that the performance of its cast iron main and copper services is declining faster than its historic rate. However, the Company has failed to demonstrate that its historic rate of replacing cast iron

main and copper service is not adequate to insure a safe, reliable, and efficient natural gas system.

Q. What information should Nicor Gas provide to support its request to accelerate its replacement program?

A. Nicor Gas should provide an overall quantification of the benefits or effects on safety, reliability, efficiency, customer satisfaction, reduced operation and maintenance costs, balanced work load, and a lower overall capital cost to complete the total replacement from the proposed accelerated replacement program.

Q. Have you reviewed Nicor Gas' request for recovery of the costs of an accelerated replacement program through Rider QIP?

A. No. I only reviewed the justification of an accelerated cast iron and copper services replacement program by Nicor Gas from an engineering perspective. Staff witness Peter Lazare discusses the rate design issues and whether recovery of the costs of an accelerated cast iron main and copper service replacement program should be recovered through Rider QIP in ICC Staff Exhibit 7.0.

Gas Storage Adjustment Factor

Q. Does Nicor Gas make any adjustments to its on-system storage fields' inventories to reflect physical gas losses and the migration of working inventory to base gas?

A. Yes. In response to Staff data request ("DR") ENG 1.02, the Company stated that it has consistently applied a 2% adjustment factor to all volumes withdrawn from its on-system storage fields since the development of those fields in the 1960's.

Q. What is the dollar value and volume of the 2% storage field adjustment from 2005 through 2009 allocated to sales customers?

A. In response to Staff DR ENG 1.03, the Company provided the dollar value and volume to sales customers of the 2% adjustment factor as follows:

	Volume (MMBtu)	Dollars
2005	446,300	$6,492,316
2006	1,843,571	$21,425,411
2007	1,739,211	$14,819,805
*2008	1,750,000	$14,844,000
*2009	1,750,000	$15,230,000

* Forecasted amounts

Q. Why does the Company apply a 2% adjustment factor to all withdrawal volumes from its on-system storage fields?

A. In response to Staff DR ENG 1.02, the Company stated the 2% adjustment factor was designed to "(1) replenishment of gas volumes that have become non-effective in contributing to the performance of the storage reservoir and (2) un-metered gas used in the storage processes of injecting, withdrawing, and operating the storage fields."

Q. What concerns do you have with Nicor Gas' use of the 2% adjustment factor for withdrawals made from its on-system storage fields?

A. I have three concerns. First, Nicor Gas failed to provide sufficient information to support the use of the 2% adjustment factor value. Second, it is not clear how Nicor Gas calculates and allocates this 2% adjustment factor to non-sales customers. Finally, Nicor Gas' accounting of these losses does not match what these losses represent.

Support of 2% Adjustment Factor

Q. Does Nicor Gas have any studies to support its use of a 2% adjustment factor for storage field withdrawals from its company-owned storage fields?

A. No. Nicor Gas indicated in its response to Staff DR ENG 1.13 that the initial studies, calculations, and analyses for the 2% adjustment factor for storage fields cannot be located.

Q. Does the Company's response to Staff DR ENG 1.13 provide any other information?

A. Yes. Exhibit 2 of the Company's response to Staff DR ENG 1.13 contains a memorandum dated April 19, 2000, regarding a follow up to a study from November of 1999, estimating the volume of gas not metered at its Ancona storage field. My review indicates that Nicor Gas applied the calculations and methodology from the Ancona study to its other storage fields to approximate the percentage of gas that is un-metered at each station (storage field).

My review of the Company's response to Staff DR ENG 1.13, Exhibit 2, indicates that the Company's data does not support the use of the 2% adjustment factor. The fact the Company cannot locate the initial bases for the 2% adjustment factor for storage and that the study results in Exhibit 2 do not support this factor indicate to me that the Company has not demonstrated that a 2% adjustment factor for storage is appropriate.

Q. What information from the Company's April 19, 2000, study is of specific concern to you?

A. The Company, in its response to Staff DR ENG 1.13, Exhibit 2, states that its un-metered numbers are just approximations and that many assumptions were used in the calculations. However, the resulting estimate for un-metered volumes for all fields in the April 19, 2000 study was 1,514,956 MMBtu (1.514 Bcf)[1].

[1] MMBtu is a unit of energy measurement where 1 MMBtu equals 1 therm. 1,000,000 MMBtu is approximately equal to 1.0 Bcf (billion cubic feet).

However, in the Company's response to Staff DR ENG 1.16, the Company states that the 2% adjustment factor for 1999 was 2,743,536 MMBtu (2.743 Bcf) and for 2000 was 2,660,452 MMBtu (2.660 Bcf). After performing the April 19, 2000, study, the Company should have compared its study results with the results of its 2% adjustment factor. The un-metered volumes estimated in April 19, 2000, are about 55% (1,514,956 / 2,743, 536 = .552 = 55%) of the Company's 1999 2% adjustment factor results.

In short, the Company's estimate of un-metered volumes performed in April of 2000 does not justify the 2% allocation factor used by the Company in 1999. The Company needs to explain in rebuttal testimony its justification of the 2% adjustment factor and what other factors, if any, it considered in determining a 2% adjustment factor.

Q. Why are you reviewing 1999 and 2000 storage adjustment data and studies when the Company is making use of a 2009 future test year?

A. The April 19, 2000 study conducted by the Company was the most recent review that was provided to me via the Company's responses to Staff DRs. Therefore, my review used the most recent information available regarding the Company's use and support for the 2% adjustment factor.

Q. How are unmetered losses allocated to individual storage fields as a result of the April 19, 2000, study?

A. The April 19, 2000, memorandum summarized below shows the Company's allocation of un-metered losses to individual storage fields.

Storage Field	Cycle Volume MMcf	Un-metered Volume MMcf	Un--metered Factor
Ancona	50,000	535.6	1.10%
Troy Grove	42,000	305.1	0.70%
P-Galesville	8,000	79.1	1.00%
P-Mt. Simon	4,000	148.8	3.70%
Hudson	8,000	148.8	1.90%
Lake Bloom.	6,000	148.8	2.50%
Lexington	5,000	148.8	3.00%

Q. What do the above un-metered factor allocations indicate to you?

A. Ancona and Troy Grove have an un-metered factor of 1.1% and 0.7%, respectively, and have the high cycle volumes. These two fields account for approximately 75% (Ancona 50,000 MMcf[2] + Troy Grove 42,000 MMcf = 92,000/123,000 MMcf total = 0.748 = 75%) of the total cycle volume for Nicor Gas' on-system storage. The remaining storage fields represent only 25% of the cycle volume but in general have much higher un-metered loss factors.

Q. Is it reasonable to apply the Company's 2% adjustment factor to each individual storage field?

A. No. Given the results from the 2000 study, summarized above, that indicate

[2] MMcf = 1,000,000 cubic feet. 1000 MMcf = 1 Bcf

both the un-metered factor and the volume of cycle gas varies considerable between storage fields, I am concerned that the Company's use of a 2% adjustment factor for all storage fields is critically flawed. In its rebuttal testimony, the Company needs to support its methodology for applying a 2% adjustment factor to all withdrawals from individual storage fields since the cycled volume and percentage of un-metered loss varies by individual storage field.

Q. Do you have any other concerns with how the Company calculates and allocates the 2% adjustment factor for storage?

A. Yes, the Company's responses to various DRs indicate an inconsistency regarding how it calculates and allocates the 2% adjustment factor for its on-system storage operations.

My review of the Company's response to Staff DR ENG 1.03 indicates that the Company calculates the 2% adjustment factor based upon the total <u>gross</u> withdrawals from its on-system storage by individual storage field. However, my review of the Company's response to Staff DR ENG 1.22 indicates that the 2% adjustment factor is allocated to users by the total <u>net</u> withdrawals from system storage, and that this calculation is not performed by storage field. As I understand what the Company is stating, it makes the calculation of the 2% adjustment factor using gross volumes by individual field, but then turns around and allocates the same factor using net withdrawals on total storage volumes.

My concern is that Nicor Gas' methodology is not consistent with its actual storage operations. My understanding is that the calculations is based on withdrawals from each individual storage field and then allocated to users of system storage based on total net withdrawals from all storage fields. I request that the Company, in its rebuttal testimony, provide further details that explain, in detail, how the 2% adjustment factor is calculated if I am wrong about the basis of the calculation. If I am correct about the basis of the calculation, the Company should explain why it is calculated this way. This explanation should also detail what users are assigned what cost as a result of this methodology.

Allocation of 2% Adjustment Factor

Q. Do you have any other concerns regarding the Company's 2% adjustment factor?

A. Yes. In response to Staff DR ENG 1.23, Nicor Gas indicates that it allocates the 2% adjustment factor to sales customers but apparently does not allocate the 2% adjustment factor to transportation customers or other customers such as Nicor's Hub. Instead, Nicor Gas indicated that deliveries into Nicor Gas' system for transportation customers are reduced by the "Unaccounted-For Gas Adjustment."

However, my understanding is that the "Unaccounted-For Gas Adjustment" is not the same as the Company's 2% adjustment factor for storage fields. The Company has not made it clear what amount, if any, of the 2% adjustment factor

for storage fields is actually assigned to transportation customers or other customers such as Nicor's Hub. Staff requests that Nicor Gas explain in rebuttal testimony who the users of its on system storage fields are, how much on-system storage volume each user type is allocated, and how each storage user is assessed its appropriate loss factor. Nicor Gas should also explain its reason for assessing or not assessing the 2% adjustment factor to all of its on-system storage users.

Types of Storage Adjustments

Q. Has the Company attempted to differentiate the 2% storage adjustment factor into different types of losses?

A. No. In response to Staff DR ENG 1.02, the Company stated, "No attempt has been made to allocate the adjustment between the ***two categories***." (emphasis added)

Q What two categories is the Company referencing?

A. The first adjustment category identified by the Company represents replenishment of gas volumes that have become non-effective in contributing to the performance of the storage reservoir. Adjustments of this type can generally not be attributed to a specific incident that is a known physical loss. This category represents gas volumes that have migrated from working inventory to base gas in the storage field. Gas volumes that migrate from working inventory

to base gas must be replaced or the storage field cannot operate as designed. I refer to this type of an adjustment as a "performance variation."

The second category identified by the Company represents un-metered gas used in the storage processes of injecting, withdrawing, and operating the storage fields. Adjustments of this type can generally be attributed to a specific incident that results from a known physical loss. This category represents gas that is physically lost or consumed from the storage field during normal operations that is not metered. I refer to this type of an adjustment as a "physical loss."

Q. Is the Company's statement in response to Staff DR ENG 1.02 that it has made no attempt to allocate the 2% adjustments between the two categories consistent with its response to other Staff DRs?

A. Not entirely. The Company's response to Staff DR ENG 1.13 contains Exhibits 2 and 3, which both discuss and estimate un-metered gas storage field usage at on-system storage fields. This indicates that the Company has estimated un-metered use at its storage fields, which is included in the 2% adjustment factor.

Q. Are you concerned that the Company has made no attempt to allocate the 2% adjustment factor between performance variations and physical losses?

A. Yes. The two categories the Company describes represent different types of adjustments that are common in the operation of storage fields. The Company needs to track these two categories of adjustments separately since they

represent different sources for inventory adjustments. Further, as is discussed in ICC Staff Exhibit 2.0, Nicor Gas should account for the different types of inventory adjustments in separate accounts.

Underground Storage Field Performance Variations

Q. What is an underground storage field performance variation?

A. As I have used the term, an underground storage field performance variation refers to changes in the storage field inventory, resulting in the need to add or subtract from the inventory at a storage field, which cannot be attributable to a specific physical incident. Underground storage field performance variations are normally detected by the deterioration of the performance of an underground storage field after an engineering evaluation of the field.

Q. How do utilities normally detect an underground storage field performance variation?

A. Storage field operators should continually monitor underground storage field performance and conduct periodic studies as well as actual physical field-testing to insure proper field operation. If underground storage field performance deteriorates, then it is possible that additional gas injections will restore peak day and annual inventory performance. Generally, utilities cannot identify the specific losses of gas that cause underground storage field performance declines, and it is probable that an accumulation of various causes lead to some

performance declines. These declines create the need for an underground storage field performance adjustment.

Q. What do you believe are some of the causes that create the underground storage field performance variation?

A. Utilities only estimate physical gas losses through engineering calculations, and these engineering calculations can introduce error over long periods. In addition, numerous gas losses can occur that are not estimated because they are unknown or are of a small magnitude. The accumulation of clerical/accounting errors, metering inaccuracies, and other operational/maintenance losses over time can also be significant. Many underground storage fields have been in service for over 50 years and over this long period, numerous factors contribute to the need to adjust the field inventory volume.

Q. Are there other significant factors that contribute to underground storage field performance variations?

A. Yes. The manner that the storage fields operate can contribute to variations in inventory volumes which affect the underground storage field's performance. For example, aquifer storage fields lose working or top gas inventory volumes to non-recoverable base gas over time.

Q. Please define the terms "top" or "working," "recoverable base" and "non-recoverable base" in reference to aquifer storage fields.

A. Natural gas is classified into three basic components in a storage reservoir: (1) top or working, (2) recoverable base, and (3) non-recoverable base. Top or working gas is the natural gas that is anticipated to be used or cycled in the normal operation of the reservoir during the injection/withdrawal season.

Recoverable base is the natural gas that is not normally cycled, but is in the reservoir to provide the pressure required to cycle the top or working natural gas. Recoverable base can be removed from the reservoir at abandonment, but represents non-depreciating capital plant during the period of operation.

Non-recoverable base is the natural gas that is trapped in the reservoir and cannot be recovered from the reservoir at abandonment, but is necessary to support the required top or working natural gas. Natural gas classified as non-recoverable base is capitalized and depreciated over the life of the field.

Q. What types of storage fields does Nicor Gas operate?

A. All Nicor Gas on-system storage fields are aquifer storage fields.

Aquifer Storage Fields

Q. How is natural gas stored in an aquifer storage field?

A. An aquifer is a water-bearing porous geologic structure. Under certain conditions, it is possible to convert this porous geologic structure to store natural gas. A necessary condition for this conversion is for the aquifer geologic

structure to have the form of a dome. Using the example of an upside-down bowl, the top of the bowl is covered with an impermeable rock formation capable of preventing the upward migration of natural gas. Under this impermeable rock is porous, water-filled rock. Natural gas is injected into the pore space of this porous rock displacing the water. The displaced water forms the seal on the bottom of the injected natural gas to contain it from below. The area storing the natural gas is referred to as the reservoir.

Q. Please explain the operation of an aquifer storage field during the injection of natural gas.

A. Natural gas is injected into the water filled porous reservoir described above through wells. These wells are simply vertical pipes that connect the storage reservoir to the surface. In order for the injected gas to displace the water from the pore space of the reservoir, the gas must be injected at a pressure higher than the water pressure in the aquifer.

As the natural gas is injected, the water is displaced from the pore space in the reservoir and moves into other areas of the reservoir. However, not all of the water is displaced from the pore space because of the physical attraction properties that create a bond between the water and rock pore space.

Q. Please explain the movement of water in the storage reservoir during the injection/withdrawal cycle.

A. As gas is injected into the storage reservoir, both initially and in all subsequent injections, it is at a higher pressure than the water in the reservoir and displaces the water to other areas of the reservoir. When gas is withdrawn from an aquifer, the gas pressure in the reservoir is reduced as gas volumes are withdrawn and the higher-pressure water will again invade or migrate back into the pore space previously occupied by the gas. This is a simplified explanation of a very complex phenomenon.

Q. Why can the operation of an aquifer storage field result in underground storage field inventory variations through the loss of working or top gas inventory to non-recoverable base gas?

A. As discussed above, natural gas is injected into an aquifer above the pressure of the water in the aquifer. The natural gas injected will expand until the gas pressure and the water pressure reach equilibrium if there are no additional injections or withdrawals and a steady state is allowed to exist. In most aquifer storage, normal operation usually results in an average gas pressure above the aquifer pressure in the storage reservoir. As a result, a small portion of the working or top gas tends to migrate to non-recoverable base gas over time, causing underground storage field inventory variations.

In addition, when gas is removed during the storage field's withdrawal cycle, the gas pressure within the field reduces allowing the water to return to areas that had previously contained gas. So each year, a utility injects gas that moves the

water out, but the water returns when the utility withdraws the gas. Because of this cycling of the storage field, a portion of the field's inventory also tends to migrate from working or top inventory to non-recoverable gas, causing underground storage field variations. Over time, this migration results in the need for an underground storage field performance adjustment.

Physical Losses of Gas Volumes from Storage Fields

Q. Explain what you mean by physical losses of gas at gas storage fields.

A. As I have used the term, a physical loss of gas from a storage field refers to any known gas loss that can be attributed to a specific event at the storage field.

Q. What can cause physical losses of gas at a gas storage field?

A. Physical losses can occur from the normal operation and maintenance of the storage field or even a leak within the storage field itself.

Q. How can normal operation and maintenance at a storage field create physical losses of gas?

A. When a utility operates and maintains the physical plant equipment, i.e., pipes, wells, compressors, etc., at a storage field, the utility may have to vent some gas in order to conduct the work on the equipment. Other examples of a physical gas loss are when equipment consumes gas for power and when in the normal course equipment used to analyze gas quality bleeds small quantities of gas to the atmosphere. Another opportunity for a physical loss occurs because of the

venting operation of safety related equipment such as relief values and emergency shut down devices designed to protect storage equipment. These and other various activities result in the known release of gas to the atmosphere.

Q. How do utilities determine the volume of gas lost to the atmosphere as the result of normal operation and maintenance at the storage field?

A. Utilities determine the volume of gas loss by using an engineering estimate calculated from the available data. This does not represent a metered or measured quantity of gas, but is only an estimate of the known gas loss.

Q. What other types of physical gas losses can occur at storage fields?

A. It is possible to have physical losses when gas escapes from the storage field itself. These losses can occur when gas escapes from geological structures or cap rock used to store and contain gas or from inject/withdraw wells connecting geologic structures to surface facilities. Physical losses of this type are very difficult to estimate. Nicor Gas, in response to Staff DR ENG 1.09, states that two of its underground storage fields, Troy Grove and Ancona, have known gas migration above the cap rock. The Company also states that it has been able to minimize gas losses at these two fields by effective reservoir management techniques. At Ancona, some of this gas collects in shallow formations and is captured and re-injected into the system. At Troy Grove, the fields A – Sand is placed on withdrawal during parts of the injection season to manage the pressure growth and minimize potential migration.

Types of Storage Adjustments - Conclusion

Q. Please summarize the results of underground storage field performance variations on the operation of an underground storage field.

A. Underground storage field performance variations may result in a deterioration of a field's ability to meet its design or rated peak day and annual inventory requirements. This deterioration results in the need to add additional gas volumes to the field to restore its ability to operate as designed and meet its rated capacities. An analysis of field operating data, engineering calculations, and actual physical testing of the field is needed to determine the volume of gas required for the underground storage field adjustment to restore the field's operation.

Q. What is the primary difference between physical losses and underground storage field performance variations?

A. Physical losses are just that, a physical loss of gas that can be attributed to a specific cause or incident, and accounted for in a specific fashion. Further, this gas is no longer contained within the reservoir and provides no support for the operation of the storage field.

Underground storage field performance variations do not represent a physical loss that can be attributed to a specific cause or incident. In contrast to the situation with a physical gas loss, an underground storage field performance

variation is not caused by a specific physical gas loss, but instead is assumed to be associated with unknown losses over time or gas that has migrated to non-recoverable base. This is because the underground storage performance variation is determined by field observations, calculations, and testing that demonstrates that the operation of the underground storage field's working or top gas inventory will not support the normal peak day and annual design/operating rating for the field.

Q What has your review of Nicor Gas' underground storage field adjustments indicated to you?

A. My review of Nicor Gas' response to Staff DRs ENG 1.02, 1.03, and 1.05 indicates the Company recorded the 2% adjustment factor to all volumes withdrawn from its storage fields for sales customers to account 823, Gas Losses.

Q. Do you agree with Nicor Gas' apparent classification of all its underground storage adjustments as "Gas Losses"?

A. No. Nicor Gas' description of what is included in its 2% adjustment factor for withdrawals in response to Staff DR ENG 1.02 indicates that some losses are storage field physical gas losses resulting from the normal operation and maintenance activities that the Company performs at its storage fields and some adjustments are underground storage field performance variations.

Q. What is your engineering opinion regarding Nicor Gas' applying a 2% adjustment factor to all storage field withdrawals and considering this volume a "Gas Loss"?

A. Nicor Gas' current methodology is not appropriate since it does not accurately reflect what gas volumes are physically lost from the storage field and what volumes are performance variations resulting from the migration of working inventory to non-recoverable base gas. Nicor Gas experienced physical losses at its gas underground storage fields. Physical gas losses in underground storage that can be attributed to one or more specific incidents or causes and replace the loss of natural gas from the underground storage field should be recognized as they occur.

Nicor Gas also experienced losses at its underground storage fields that cannot be attributed to a specific incident or cause that resulted in the loss of gas. These losses are detected when a deterioration of underground storage field performance is discovered during engineering evaluations. Underground storage field performance variations cannot be attributed to a specific incident or cause, but represent gas volumes that must be injected into the underground storage field to maintain the field's peak day and annual volume rated design/operating performance. The adjustment associated with underground storage field performance variations should be treated as non-recoverable base gas since the adjustment volume represents the volume of gas that must be injected into the field to maintain field performance and is not tied to a specific physical loss of gas.

Q. What do you propose the Company be required to do to appropriately reflect storage field adjustments?

A. The Company should be required to establish written procedures and an appropriate methodology to determine and monitor the volumes of gas that are physical losses and the volumes of gas that are performance variations that result from the migration of working inventory to non-recoverable base gas. Staff does not dispute the recovery of legitimate storage field adjustments. However, Staff witness Hathhorn discusses the accounting Staff believes is required by the "Uniform System of Accounts" in ICC Staff Exhibit 2.0.

Written Policy

Q. Does Nicor Gas have an established written policy or methodology concerning how it categorizes physical gas losses and performance variations when making its underground storage field adjustments or corrections?

A. No. In response to Staff DR ENG 1.02, Nicor Gas states that it applies a 2% adjustment factor to all volumes withdrawn from its storage fields and makes no attempt to allocate the adjustment by category.

Q. Does Nicor Gas need a written policy concerning underground storage field adjustments or corrections?

A. Yes. My review of Nicor Gas' underground storage adjustments/corrections indicates that Nicor Gas provides the same treatment to all types of gas

inventory adjustments when Nicor Gas should instead take into account the source and types of inventory adjustments. Therefore, I recommend that Nicor Gas develop written procedures for the treatment of the source and types of inventory adjustments from its on-system storage fields. The establishment of written procedures will insure storage field adjustments reflect actual operations and distinguish between physical losses and performance variations which will permit the appropriate accounting treatment to be applied.

Conclusion

Q. What conclusions or recommendations did you make in your direct testimony?

A. I concluded that Nicor Gas failed to demonstrate in this proceeding the justification of its program to accelerate the replacement of cast iron main and copper service in its natural gas system.

I also concluded that Nicor Gas needs to provide additional details in rebuttal testimony regarding how it determined the 2% storage adjustment factor as well as provide further information regarding how it allocates this factor among the users of its on-system storage system.

Next, I concluded that Nicor Gas' current methodology used to account for storage field adjustments is not appropriate since it does not accurately reflect what gas volumes are physically lost from the storage field and what volumes are

performance variations resulting from the migration of working inventory to non-recoverable base gas.

Finally, I recommended that Nicor Gas develop written procedures for the treatment of the source and types of losses from underground storage fields. The establishment of written procedures will insure storage field adjustments reflect actual operations and distinguish between physical losses and performance variations which will permit the appropriate accounting treatment to be applied.

Q. Does this conclude your prepared direct testimony?

A. Yes.

VERIFICATION

I, Dennis L. Anderson , being first duly sworn, depose and state that I am a Senior Energy Engineer in the Engineering Department of the Energy Division of the Illinois Commerce Commission; that I sponsor the foregoing Direct Testimony of Dennis L. Anderson ; that I have personal knowledge of the information stated in the foregoing Direct Testimony; and that such information is true and correct to the best of my knowledge, information and belief.

Illinois Commerce Commission

Subscribed and sworn to before me
this 27th day of August, 2008.

Notary Public

OFFICIAL SEAL
LISA BOWMAN
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 12-9-2011