REDACTED

DIRECT TESTIMONY

OF

ERIC LOUNSBERRY

ENGINEERING DEPARTMENT

ENERGY DIVISION

ILLINOIS COMMERCE COMMISSION

ILLINOIS POWER COMPANY

d/b/a AmerenIP

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Q. Please state your name and business address.

A. My name is Eric Lounsberry, 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 Supervisor of 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 the University of Illinois and a Master of Business Administration degree from Sangamon State University (now known as the University of Illinois at Springfield).

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

A. I assign my employees or myself to cases, provide training, and review work products over the various areas of responsibility covered by the Gas Section. In particular, the responsibilities and duties of Gas Section employees include performing studies and analyses dealing with day-to-day, and long term, operations and planning for the gas utilities serving Illinois. For example, Gas Section employees review purchased gas adjustment clause reconciliations, rate base additions, levels of natural gas used for working capital, and utility

applications for Certificates of Public Convenience and Necessity. They also perform audits of utility gas meter shops.

Q. What is the purpose of this proceeding?

A. On November 22, 2005, the Commission initiated its annual reconciliation of costs and revenues under the Purchase Gas Adjustment ("PGA") clause for fiscal year 2005, as filed by Illinois Power Company ("IP" or the "Company"), pursuant to Section 9-220 of the Illinois Public Utilities Act. This investigation was initiated to determine whether IP's PGA clause reflects the actual costs of gas and gas transportation for the twelve-month period from January 1, 2005 through December 31, 2005, and whether those purchases were prudent.

Q. What is your assignment within this proceeding?

A. My assignment is to review and analyze the Company's reconciliation in order to make a recommendation regarding whether IP's natural gas purchasing decisions for the 2005 reconciliation period were prudent.

Q. Do you have any schedules attached to your direct testimony?

A. Yes. I have two schedules attached to my direct testimony:

Schedule 2.01	Seasonal Storage Adjustment
Schedule 2.02	Seasonal Storage Benefit

Q. Do you have recommendations as to whether IP's natural gas purchasing decisions were prudent?

A. Yes, using the Commission's criteria for prudence, I have determined that certain of the Company's natural gas purchasing decisions during the reconciliation period were not prudent. I recommend the Commission find the $988,200 in additional gas costs that IP incurred as a result of the reduction of seasonal withdrawal capacity of its Hillsboro storage field imprudent.

I am also recommending that the Company provide in its 2007 reconciliation proceeding, a study showing whether or not the 5.8 billion cubic feet ("Bcf") of additional gas that the Company returned to the field over the past several injection seasons has actually returned the field to same state that it operated after it was initially expanded in 1993.

Q. What criteria does the Commission use to determine prudence?

A. The Commission has defined prudence as:

> […] **that standard of care which a reasonable person would be expected to exercise under the same circumstances encountered by utility management at the time decisions had to be made. In determining whether a judgment was prudently made, only those facts available at the time judgment was exercised can be considered. Hindsight review is impermissible.**
>
> **Imprudence cannot be sustained by substituting one's judgment for that of another. The prudence standard recognizes that reasonable persons can have honest differences of opinion without one or the other necessarily being 'imprudent'. (Commission v. Commonwealth Edison Company, Docket No. 84-0395, Order dated October 7, 1987, page 17).**

Hillsboro Storage Field

Q. During the reconciliation period, did the Hillsboro storage field operate in a manner that you would consider prudent?

A. No. The Hillsboro storage field operated at a reduced seasonal capacity level during a portion of the winter months within the reconciliation period.

Q. Why do you believe the reduced level of seasonal gas supply associated with the Hillsboro storage field is imprudent?

A. I have several reasons for finding the reductions in the Hillsboro storage field imprudent. These are broken down into two main areas: (1) IP's actions that relate directly to the Hillsboro storage field and its inability to recognize its problems in a timely fashion and (2) IP's actions regarding its storage operations overall. My overall conclusion is that IP should have identified and acted upon the reduced inventory and deliverability problems at the Hillsboro storage field several years prior to the reconciliation period (calendar year 2005) involved in the instant proceeding.

IP had several opportunities to discover the inventory shortfall at its Hillsboro storage field in a timely fashion, yet failed to do so. In particular, IP determined that its injection and withdrawal metering errors offset when it was already in possession of data that disputed that conclusion. Further, IP had data regarding the operation of the field that contradicted its assumption that the Hillsboro

storage field was experiencing a "reservoir problem" versus an inventory shortfall.

My review also indicates several significant areas of concern regarding IP's overall storage operations. These concerns include reduction in management oversight, reduction in capital spending, and the inability to identify problems or to conduct thorough root cause analyses. All of these areas contributed to the Company's action of reducing the seasonal deliverability of the Hillsboro storage field and increased the Company's gas costs during the reconciliation period.

Q. Has the Commission previously reviewed the Company's actions that resulted in the reduced seasonal deliverability of the Hillsboro storage field in the instant proceeding?

A. Yes. In Docket No. 03-0699 (IP's 2003 PGA reconciliation), I made virtually the same arguments that are being made in the instant proceeding to conclude that IP acted imprudently when it reduced the peak day and seasonal capacity rating of the Hillsboro storage field. The Commission's Order in Docket No. 03-0699 indicated that:

> Based on its review of the record, the Commission concludes that the record establishes that IP did not act prudently in connection with the investigation, identification and remediation of the declines in the deliverability of the Hillsboro Storage Field. Although the Company did expend internal and external resources, in attempting to identify the causes of the Hillsboro Storage Field deliverability decline, based on the record, the Commission concludes that IP's actions and decisions did not meet the standard of prudence that the Commission has adopted. The Commission concludes that the Company was imprudent in its operation of the Hillsboro storage field in that it: 1) failed to conduct a thorough study of the injection

> error at the time it was identified; 2) failed to conduct any inspections to assure that the orifice meters were working properly; 3) failed to begin returning the inventory to the field when the working gas volumes fell below the pre-expansion volume of 3.1 Bcf after the 1999-2000 winter season.
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> *****
>
> In summary, the Commission concludes that all things considered, AmerenIP acted imprudently in its response to the deliverability problems at the Hillsboro Storage Field and agrees with Staff that the Company should have begun replacement of the HSF inventory in 2000. AmerenIP's repeated failures to properly operate and manage its natural gas storage fields in a prudent manner has resulted in cost increases that the Commission can no longer allow to be passed on to captive customers. While human error is inevitable, AmerenIP's repeated failures have risen to the level of imprudence. In the Commission's view, repeated human error demonstrates a lack of oversight and attention that constitutes imprudent operation and management of the Hillsboro Storage Field.… (Order, Docket No. 03-0699, pp. 35-37, September 26, 2006)

Q. Has IP returned the Hillsboro storage field to its expected operating levels?

A. According to the Company, yes. In its response to Staff data request ENG 1.59, the Company indicated that it had restored the Hillsboro storage field's working gas inventory level to 7.6 Bcf in November 2005 pursuant to its injection and withdrawal metering records at the field, by replacing the 5.8 Bcf inventory shortfall identified in its 2004 Hillsboro deliverability study. IP also indicated that in the maximum peak day rating was confirmed by testing in 2004 and 2005.

Q. Are you satisfied by the Company's response?

A. No. Whereas I do not disagree with any of the factual statements, my concern is that the Company just replaced the volume of gas that its 2003 review indicated was required without necessarily performing any additional checks on the field

and its performance. My recommendation is for the Company to conduct a follow-up review that at a minimum determines whether or not the 5.8 Bcf of replacement gas actually returned the field to the same condition that it was in after it was expanded in 1993. The Company, after observing the manner the Hillsboro storage field operates at its current inventory levels for a couple of injection and withdrawal seasons, should provide a study as part of its 2007 reconciliation testimony that demonstrates the 5.8 Bcf of replacement gas was the appropriate amount in order to return the field to its initial post-expansion levels.

At a minimum, I would expect this review to include a comparison of the information that the Company uses as input data for its reservoir model from the original post expansion period (prior to any inventory shortfalls) to the time periods subsequent to the date that the Company believes it has fully replaced the inventory at the Hillsboro storage field. For example, this review could include, but not be limited to, a comparison of water levels and neutron logs from the original post expansion period to the more recent information.

The Company should also perform reservoir simulations with its model that forecasts how the field will operate and then make a comparison of that projection to the actual operation of the field. Next, the Company should strive, weather permitting, to fully cycle the top gas inventory at the field. Finally, the Company should conduct a late season peak deliverability test at the field that would mimic the late season decline curve expectations that existed after its 1993 expansion; for example, if in 1993 the Hillsboro storage field was designed

to provide its peak day deliverability of 125,000 Mcf/day in early February after 75 or 80% of its inventory was removed, then this same test should be conducted for the field with its replenished inventory.

Calculation of Hillsboro Adjustment

Q. What level of additional cost did you determine that IP incurred during the reconciliation period as a result of its imprudent actions involving its Hillsboro storage field?

A. I determined that IP incurred an additional cost of $988,200 associated with the reduction in the volume of gas that was available to withdraw during the winter season.

Q. How did you determine that IP incurred $988,200 of additional cost during the reconciliation period associated with the reduction in the volume of gas that was available to the Company for withdrawal from the Hillsboro storage field during the winter season?

A. I compared IP's weighted average cost of gas in storage for the winter months at question in this reconciliation period to the weighted average price of commodity gas purchased by IP for the same time period. From that comparison, I determined the average per unit savings achieved by month associated with IP having natural gas storage. This calculation is shown on ICC Staff Exhibit 2.00, Schedule 2.02.

I also compared the actual volume of gas withdrawn from the Hillsboro storage field for each month of the winter season to the prorated volume of gas that IP withdrew from Hillsboro in the winter season of 1993/1994 (the only occasion where IP cycled 7.6 Bcf from Hillsboro). I then took the monthly volume difference and multiplied that monthly value by the monthly average per unit savings. The result of this calculation, as shown on ICC Staff Exhibit 2.00, Schedule 2.01 was an adjustment of $988,200.

Q. Why did you assume the Hillsboro storage field would cycle a prorated amount of the full 7.6 Bcf inventory volume when you calculated the seasonal value associated with the Hillsboro storage field?

A. The manner in which the Company operates its storage field can be impacted by the temperatures that a utility experiences during the winter season. Therefore, if a utility experienced warmer than normal temperature during a winter season, less gas would be withdrawn from storage. Prorating the 7.6 Bcf to account for the temperature variance between the winter months in the instant proceeding to the 1993 season (the year 7.6 Bcf was withdrawn) in essence normalizes the impact of temperature on the seasonal calculation.

Aside from accounting for the temperature difference, my calculation assumes the full 7.6 Bcf would be cycled because the Company's response to Staff data request ENG 1.73, from Docket No. 04-0476, noted that IP intends to fully cycle the Hillsboro storage field in a normal winter season.

Q. Has the methodology you used to determine the seasonal benefit associated with the Hillsboro storage field been previously used before the Commission?

A. Yes. In the prior two Company PGA proceedings, Docket Nos. 03-0699 and 04-0677, the same methodology was used. In those proceedings, Staff and the Company agreed to that methodology for calculating the seasonal benefit associated with the Hillsboro storage field. However, the Company disputed the need for the calculation given its views that its actions regarding the Hillsboro storage field were prudent.

Prior Commission Orders

Q. Are there any Commission Orders dealing with IP's Hillsboro storage field that you believe are relevant to this proceeding?

A. Yes. In Docket No. 91-0499, IP received a certificate of public convenience and necessity for the construction of a 62-mile pipeline to transport gas to and from the expanded Hillsboro storage field. In other words, the pipeline was necessary in order to effectively expand, or to use the expanded, Hillsboro storage field. The Company within that proceeding represented that the pipeline would allow for the increased seasonal working gas inventory in the field. Specifically, the Commission's Order in that proceeding noted the following:

> Mr. Brodsky testified that the Project will increase the total working gas inventory of the Hillsboro Storage Field from 3.1 billion cubic feet ("BCF") to 7.6 BCF, the injection rate to the Storage Field from 13,000 thousand cubic feet ("MCF")/day to 40,000 MCF/day, and the withdrawal or delivery rate from 50,000 MCF/day to 125,000 MCF/day. The Project is intended to increase Illinois Power's total

> storage capability by 42 percent, and to increase its total peak day storage withdrawal capability by 14 percent. Estimated gas-in-place after the Hillsboro Storage Field expansion will be 21.7 BCF, consisting of 7.6 BCF of inventory gas and 14.1 BCF of base gas. Order, Ill. C.C. Docket No. 91-0499, p. 3 (October 21, 1992)

Further, in IP's next to last natural gas rate case before the Commission, Docket No. 93-0183, IP proposed to include the cost to expand the peak day capacity and seasonal inventory capabilities of the Hillsboro storage field into base rates. In particular, the Commission stated as follows in its Order in Docket No. 93-0183:

> IP is expanding the capacity of its Hillsboro storage field in Montgomery County by 4.5 BCF and the daily withdrawal rate at the field by 75,000 million cubic feet ("MCF"). IP is also constructing a 62-mile pipeline from Hillsboro to Decatur and additional transmission facilities from Hillsboro to the Metro-East Area. The IP witnesses indicated in their rebuttal testimony that the Hillsboro Project was placed in service on August 31, 1993, with the exception of two new delivery/control stations being constructed near Arthur, Illinois, to enhance interconnections with major pipeline suppliers in the area. Order, Ill. C.C. Docket No. 93-0183, p. 8 (April 6, 1994)

On pages 11 and 12 this same Order the Commission stated:

> …Finally, the Commission concludes that the Hillsboro Project will provide substantial net economic and other benefits to IP's customers; that the project is necessary in order for IP to provide adequate, efficient and reliable service to its customers at lowest cost, and that it should be considered used and useful upon being placed into operation. (*Id*. at 11-12).

Q. How does the current operation of the storage field compare to the post-expansion levels at the Hillsboro storage field?

A. As Table 1 below indicates, the Hillsboro storage field has not operated near the levels discussed in Docket No. 93-0183 since it was placed into service for the winter season of 1993-1994.

Table 1

Winter Season	Peak Day Rating 93-0183	Peak Day Rating Actual	Percentage Of 93-0183 Rating	Volume to Cycle 93-0183	Actual Volume Cycled	Percentage of 93-0183 Rating
1993-1994	125,000	125,000	100.00	7,600,000	7,583,611	99.78
1994-1995	125,000	125,000	100.00	7,600,000	5,951,065	78.30
1995-1996	125,000	125,000	100.00	7,600,000	4,937,930	64.97
1996-1997	125,000	125,000	100.00	7,600,000	4,291,916	56.47
1997-1998	125,000	125,000	100.00	7,600,000	4,230,985	55.67
1998-1999	125,000	125,000	100.00	7,600,000	4,099,140	53.94
1999-2000	125,000	100,000	80.00	7,600,000	3,050,370	40.14
2000-2001	125,000	100,000	80.00	7,600,000	2,916,351	38.37
2001-2002	125,000	100,000	80.00	7,600,000	2,759,938	36.31
2002-2003	125,000	100,000	80.00	7,600,000	2,576,839	33.91
2003-2004	125,000	125,000	100.00	7,600,000	2,616,540	34.43

Source: Company's response to Staff data requests ENG 1.73 and 1.77 from Docket No. 04-0476.

Q. Are there any other Commission cases that you believe are relevant to the issues in this proceeding?

A. Yes. In Docket No. 04-0476, the Company's most recent rate case before the Commission, Staff raised many of the same arguments discussed below. The Commission relied upon Staff's arguments to reach the conclusion that the Company would not be allowed to earn a return on the revised value of base gas associated with the Hillsboro storage field and also found the Hillsboro storage field operated at only a 53.44% used and useful value. Therefore, Staff considers its current recommendations are consistent with the Commission's conclusions from Docket No. 04-0476.

Finally, as I noted above, in Docket No. 03-0699, the Commission determined that IP actions regarding the reduced seasonal and peak day deliverability of its

Hillsboro storage field were imprudent. The information and arguments being made in the instant proceeding are virtually identical to those contained in Docket No. 03-0699. Staff also raised the issue of the prudence of IP's actions associated with the Hillsboro storage field's reduced seasonal deliverability in its 2004 reconciliation, Docket No. 04-0677, using virtually the same arguments contained in the instant proceeding. However, the Commission has not yet issued a ruling in Docket No. 04-0677.

Background of Hillsboro Problems

Q. Why was IP unable to operate the Hillsboro storage field at its maximum seasonal withdrawal levels during the reconciliation period?

A. According to IP's September 16, 2004, Hillsboro Storage Field Deliverability Study Final Report ("Hillsboro Study"), the Company determined that Hillsboro's total gas inventory should be reduced by 5.8 Bcf[1] such that as of November 30, 2003 Hillsboro's total inventory based on the orifice book records was 22.6 Bcf and should be reduced to 16.8 Bcf. The Hillsboro Study also indicated that this inventory shortfall directly affected the deliverability characteristics of the Hillsboro storage field.

Q. Why did the 5.8 Bcf gas inventory error occur?

A. According to the Company's responses to Staff data requests ENG 1.36 and ENG 1.49 (from Docket No. 04-0476), IP determined that it had experienced a

[1] BCF refers to a volumetric unit of measurement that is equal to 1,000,000 Mcf, where a Mcf refers to 1,000 cubic feet. A Mcf is roughly equivalent to 1 DTH or 10 therms.

significant gas measurement error at its Hillsboro storage field during the period November 1993 through October 1999. IP estimated that the impact due to the measurement errors caused its measurement records to overstate its actual gas inventory by 5.8 Bcf.

Q. Do you agree that 5.8 Bcf of inventory is the appropriate amount of gas that was not correctly measured from the Hillsboro storage field?

A. No. I testified in Docket No. 04-0476 that the use of the 5.8 Bcf as the amount of inventory adjustment that was needed for the Hillsboro storage field was not an appropriate value to use for ratemaking purposes. However, for the instant proceeding, the amount of the measurement error has very little impact on my calculation, since I based my adjustments on the actual operation of the Hillsboro storage field. Therefore, for the purposes of this proceeding, I have made the assumptions that the 5.8 Bcf value is correct.

Q. Has IP experienced problems with its Hillsboro storage field prior to the reconciliation period?

A. Yes. As Table 1, above, indicates the Hillsboro storage field has not operated near the levels discussed in Docket No. 93-0183 since the expansion was placed into service for the winter season of 1993-1994.

Q. Has the Company ever detailed the various problems it experienced at its Hillsboro storage field?

A. Yes. In Docket No. 04-0476, the Company's testimony (IP Exhibit 14.1R, pages 5 through 19) provided a short history of the problems the Company has experienced at the field since its expansion as well as a discussion about the various actions or reviews that Company has taken. This testimony noted that based on several years of declining annual deliverability, the Company first observed there was a problem at the Hillsboro storage field at the end of the 1995-1996 withdraw season.

The Company testimony (IP Exhibit 14.1R, Docket No. 04-0476) stated that the Company investigated various reservoir problems at the field. Specifically, the Company investigated whether gas was migrating from the underground structure, or alternatively, if the shape of the structure was different from what was expected. The Company indicated that the result of either situation could be that gas injected into the field was moving or being pushed to areas where it could not be reached by the withdrawal wells.

Next this testimony noted that in 1998, the Company had an outside consultant conduct a 3-D seismic study of the Hillsboro storage field. The Company indicated the preliminary results of this study indicated that approximately 3.5 Bcf of gas had migrated to another underground structure to the northeast of the Hillsboro storage field.

Further, in August 1999, the Company hired Peterson Engineering to conduct an audit of its metering at the Hillsboro storage field. Peterson Engineering issued its report in December 1999 ("Peterson Report"). The testimony indicated the

Peterson Report was commissioned to determine whether metering errors could be eliminated as a source of the apparent deliverability problems.

The testimony noted that the Peterson Report identified two problems associated with the metering at the Hillsboro storage field. First, it determined that two new turbine meters used to measure injections that had been installed at the field were over-registering gas volumes under certain operating conditions. Specifically, when the compressors were operating at 50% loadings, they caused the turbine meter rotor to over spin, thereby recording a greater amount of gas as having been injected than was in fact passing through the meter. At higher compressor loadings, there was minimal over-registration (approximately 1.7%).

Further, the Peterson Report also found a problem with the orifice meter on the south withdrawal secondary run at the field. The orifice opening that had been stamped on the equipment at the manufacturer's plant was the same value that the Company had ordered, but the actual size of the opening was actually smaller than the value stamped on the orifice plate. This error meant that less gas was being withdrawn from the field than had been believed.

The testimony next noted that the Company originally determined that the two metering errors at the Hillsboro storage field (on injections (turbine meters) and withdrawals (orifice meter)) were approximately equal and offsetting. The Company also indicated that various operating procedures were implemented in May 2000 at the field to improve the field's gas measurement, such as avoiding loading the compressors at rates that caused significant meter errors.

The testimony then noted that the Company, as a result of the 3-D seismic study, drilled the Furness No. 1 withdrawal well to the northeast of the Hillsboro Storage Field where it was believed a sub-structure existed to which gas had migrated from the main reservoir structure, in order to facilitate recovery of the gas. The well was drilled in November 2000.

The Company stated that the Furness No. 1 well indicated that there was not a separate sub-structure to the northeast of the main Hillsboro structure as had been believed. IP concluded that the original interpretation of the 3-D seismic study had not been correct and requested its external consultant to again review and re-evaluate the 3-D seismic survey information.

In June 2001, a crosswell seismic survey was performed. The Company indicated that a crosswell seismic survey is a high resolution process capable of resolving features smaller than those visible with the 3-D seismic data. Based on the results of the Furness No. 1 well and a reevaluation of the 3-D seismic survey information, the consultant concluded that the additional structure that had been thought to exist to the northeast of the field did not exist. Thus, the Company's original hypothesis that approximately 3.5 Bcf of gas had migrated to another underground structure to the northeast of the field was disproved in the fall of 2001.

The Company also indicated it performed several well stimulation treatments at the wells in the field. These treatments consist of injecting chemicals into a well bore and the underground reservoir in an effort to clean up any damage to the

formation and increase the productivity of the well. These treatments were performed on two wells in November 2000, two more in December 2001, and finally, two additional wells in November 2002.

In addition, the Company indicated that it had analyzed the reservoir performance by reviewing the observation well water level and water production data over time. This review indicated that the volume of gas in the reservoir was decreasing. A significant observation was that the working gas volumes in the reservoir had declined to below the 3.1 Bcf. The Company stated that this observation indicated that the source of the deliverability problems for the expanded field was not structural since the total working gas capacity of the field should have at least stabilized at 3.1 Bcf, but it did not.

Finally, the Company indicated that in the spring of 2003, the Company concluded it would be necessary to substantially restate the volumes in the storage field. As a result, the Company developed an estimate of the gas inventory shortfall that resulted from the metering error.

Q. What actions did the Company take in the spring of 2003?

A. The Hillsboro Study indicated that in 2003 a reservoir engineering study was conducted to determine the cause of the Hillsboro storage field's continuing decline in peak day and total deliverability. The reservoir study consisted of three parts:

1. Meter Study
2. Volumetric Analysis

3. Reservoir Simulation Study

Meter Study

Well Charts

Q. What is a well chart?

A. A well chart refers to the chart used to record the output from the orifice meters located at each individual well at Hillsboro. These charts show the various pressure and temperature information necessary to calculate the volume of gas passing through the meter. The Peterson Report indicated that IP personnel read the charts at Hillsboro at two-hour intervals and changed out the charts weekly.

Q. How did IP use the well charts to measure the injection error at the Hillsboro storage field?

A. The Hillsboro Study, pages 2 and 3, noted that the individual well charts were used to make a comparison between well meters and plant metering to determine a correction factor to apply to the plant metering for injection. In particular, the Hillsboro Study, page 2, noted that, to calculate a given month's total injection, a "snapshot" of 5 days of well chart data in that month was used as a proxy for the entire month. An average correction factor for the injection season was calculated from the monthly data.

The Hillsboro Study, page 3, indicated that IP sent the charts from the years 1994 and 1998 to a chart integration service, but that IP hand integrated the 1995 and 1999 charts using IP's in-house spreadsheets. The Hillsboro Study also indicated that IP did not use the 1996 and 1997 charts because they did not coincide with the start of the pipeline day due to a change in Federal Energy Regulatory Commission rules.

Q. What did IP's review of the well charts indicate?

A. The Hillsboro Study, page 3, noted that the review calculated the following correction factors for the volume of gas injected for each year studied (in percent error):

1994	-22.1%
1995	-7.0%
1998	-12.7%
1999	-8.9%

Q. Did IP ultimately use any of these values?

A. Yes. As I discuss below, IP ultimately determined a 22.1% correction error to its injection volumes for all years, which matched the estimate provided for 1994.

Compressor Logs

Q. Aside from the well charts, is there any other data that IP attempted to use in an attempt to estimate the measurement error associated with its injections into the storage field?

A. Yes. According to the Hillsboro Study, IP attempted to make use of compressor logs to estimate the measurement error at its Hillsboro storage field.

Q. What are compressor logs?

A. A compressor log is a paper record of the operation of a compressor[2] and would include information regarding the operating rate (operating speed) for the compressor.

Q. Did IP conduct a review of its potential measurement error through its compressor logs?

A. No. The Hillsboro Study, page 3, notes that IP did not use the compressor logs. IP's investigation noted that the logs were a paper record kept only when the Hillsboro storage field was manned, mostly during daylight hours. The Hillsboro Study also noted that the compressors were allowed to step up and down (increase or decrease their operating rate) as line pressure changed with no record being kept during the off shift. Therefore, IP did not have sufficient information to use the data from the compressor logs to determine any injection error correction factors.

Volumetric Analysis

Q. How did IP attempt to determine the measurement error through a volumetric analysis?

[2] A compressor is a machine used to increase the pressure of natural gas in a pipeline system.

A. According to the Hillsboro Study, page 3, IP used well logs to calculate the volume of gas in place in the reservoir in the fall of 2003.

Q. What are well logs?

A. A well log, also called a neutron log, measures hydrogen ion concentration (a major component of natural gas is hydrogen) within the well bore. This information can be used to detect casing leaks and provides a gas saturation value that is used to extrapolate the amount of gas in place at storage fields.

Q. What volume of gas did the Hillsboro well logs indicate?

A. The Hillsboro Study, page 4, stated that the volumetric analysis showed an inventory at the field of 14.2 Bcf for November 2003. The Hillsboro Study also notes that IP's book records for Hillsboro in November 2003 showed a total volume of 22.6 Bcf. Therefore, the volumetric analysis showed a variance of 8.4 Bcf. However, the Hillsboro Study did note that there are accuracy limitations with using a neutron log. Therefore, IP did not directly use the value calculated. Instead, the information merely provides assurance that there was a significant measurement error regarding the volume of gas contained in Hillsboro.

Reservoir Simulation

Q. What other reviews did IP conduct to estimate the measurement error at the Hillsboro storage field?

A. IP also made use of a reservoir simulation to estimate the measurement error at the Hillsboro storage field.

Q. What was the result of the reservoir simulation review?

A. According to the Hillsboro Study, pages 3-4, a reservoir simulator was used to model the chart correction data using various correction factors. The Hillsboro Study noted that a 22% correction factor provided the best match to observation well pressures, shut in pressures, flowing pressures, and well log data. Using the 22% correction factor provided a volume of gas in place of 16.8 Bcf, which was 5.8 Bcf less than the amount IP had on its books.

Q. What was IP's ultimate determination for the measurement error at Hillsboro?

A. Based upon all of the above analysis, IP determined the appropriate total volume for the measurement error at Hillsboro was 5.8 Bcf, which resulted in a 22.1% correction factor (reduction in volume injected), for each year, being applied to the Hillsboro injections during the period when the measurement errors existed.

Specific Hillsboro Items

Q. Based on your review of the material involving the Hillsboro storage field when should the Company have realized the inaccuracy of its inventory?

A. As I will discuss below, the Company had several opportunities to detect that it had a large inventory problem at its Hillsboro storage field, yet failed to do so. In particular, I determined that IP should have found the problem by the 2000

injection season. This would have allowed IP to inject replacement gas over the next four injection seasons (2000, 2001, 2002, 2003) using the same injection schedule IP discussed in its Hillsboro report. Had IP used this time to replace its inventory, it would have completed the gas inventory replacement at the Hillsboro storage field prior to the instant reconciliation period. Having the full capacity of the field would have allowed IP to use more of the seasonal capacity of the Hillsboro storage field in the instant reconciliation period instead of relying upon more expensive gas sources. I made this conclusion based on my review of the following information.

Hillsboro Metering Review

Q. What did IP conclude about its metering problems at Hillsboro after it received the Peterson Report in December 1999?

A. IP concluded that the measurement errors that incurred during injection and withdrawal basically offset each other. According to the Company's response to Staff data request ENG 1.81 (from Docket No. 04-0476), IP estimated a 937,000 Mcf overstatement for withdrawals and an overstatement of 997,000 Mcf on injections, which, when combined, resulted in a net difference of 60,000 Mcf. This meant that IP's original estimate would have required a 60,000 Mcf reduction in the inventory volume in order for Hillsboro's records to be accurate.

Q. What is IP's current estimate for the measurement error?

A. As noted above, IP now estimates that the injection overstatement was 5.8 Bcf or 5,800,000 Mcf. This value is almost 97 times larger than the original net difference between injection and withdrawals that IP calculated and is almost 6 times larger than IP's original estimate for the total overstatement of the injection volume.

Q. How did IP originally determine its injection shortfall was only 60,000 Mcf, versus the ultimate 5.8 Bcf value it ultimately calculated?

A. In its response to Staff data request ENG 1.81 (from Docket No. 04-0476), IP indicated that it estimated the withdrawal error based on estimates of storage field records for when the south pipeline secondary run was used. IP estimated the injection error based on the estimated split that 15% of the time the compressors were run at 50% loading and 85% of the time the compressors were run at 100% loadings. IP has now determined that its injection error calculation was incorrect.

Q. What observations can you make from the above information?

A. The Company's response clearly indicates that it made an assumption about the loading rate of the compressors. However, the only means that IP had for making assumptions about the loading rate of the compressor over a historical time period was through its compressor logs.

As noted above, when IP conducted its Meter Study in 2003, the Hillsboro Study noted that IP's investigation indicated the compressor logs were a paper record

kept only when the Hillsboro storage field was manned, mostly during daylight hours. The Hillsboro Study also noted that the compressors were allowed to step up and down (increase or decrease their operating rate) as line pressure changed with no record being kept during the off shift. Therefore, IP, as part of its 2003 Meter Study, determined it did not have sufficient information to use the data from the compressor logs to estimate any injection error correction factors.

Obviously, if IP determined the historical records were insufficient to use in 2003, IP did not have sufficient records to make the determination in 2000 that the injection and withdrawal metering errors offset each other.

Q. During IP's 1999/2000 review into the Hillsboro storage field's metering error, did IP have any other information available to estimate the injection metering error?

A. Yes. The Company's response to Staff data requests ENG 1.92, 1.93 and 1.94 (from Docket No. 04-0476) provided basic information regarding the timing and number of well charts IP had integrated as part of its 2003 meter study. These responses indicated that prior to its 2003 study IP had already integrated about 1500 of the 1994 well charts in the mid-1990s. These responses also indicate that the integration data from 624 of those charts was used when IP calculated the 22.1% correction factor its 2004 Hillsboro Report. Therefore, in 1999 when IP determined the metering errors offset each other, it was in possession of information that contradicted that conclusion. In fact, the information squarely pointed to a significant inventory shortfall at the Hillsboro storage field.

Q. What do you conclude from the above information?

A. The information provided indicates to me that IP had data in its possession that indicated a massive inventory shortfall at the Hillsboro storage field. In fact, IP should have discovered the true extent of the metering error at the Hillsboro storage field shortly after it received the Peterson Report. As noted above, the Company's own testimony from Docket No. 04-0476 indicated that the Peterson Report was commissioned to determine whether metering errors could be eliminated as a source of the apparent deliverability problems.

However, instead of using the information that was available to it at the time of its 1999/2000 inventory error review, IP made unsupportable assumptions about the Hillsboro compressor loadings that allowed it to reach the invalid conclusion that the injection and withdrawal metering errors offset each other. Had IP conducted a thorough review in 1999/2000, IP would have discovered it had a significant measurement error at its Hillsboro storage field and could have started to inject the inventory shortfall in 2000.

Q. In Docket No. 04-0476, you indicated IP's estimate of 5.8 Bcf was not accurate enough for rate making purposes; however, you indicate in the instant proceeding that the well chart information would have allowed IP to recognize the magnitude of its measurement errors. Are these conclusions in conflict with each other?

A. No, I do not consider my recommendations from the PGA proceeding to be in conflict with the conclusions reached in the last rate case.

In IP's last rate case, Docket No. 04-0476, I recommended that the Commission reject IP's request because its estimate of the gas measurement error experienced during the period November 1993 through October 1999 was not accurate enough to base a recalculation of the non-current gas (recoverable base gas) amounts. I noted that IP's review determined a likely total volume error for the Hillsboro storage field. Then IP applied a constant correction factor throughout the period during which IP believes the error existed at the field. However, IP did not have sufficient information to determine if a constant correction factor was appropriate or if some other value is necessary. Further, the total volume error, while supported by analysis from an outside entity, is also just a best guess at the volume that was not measured. (ICC Staff Exhibit 17.0 2nd Rev, Docket No. 04-0476, pages 5-6)

For example, IP's measurement error associated with its turbine injection meters was dependent upon the operating rate of the compressors at the Hillsboro storage field; however, those compressors were allowed to step up and down and would not have created a constant error rate from day to day or even month to month. Further, as is discussed below, IP's orifice meters used to measure the volume of gas withdrawn from the field were not maintained properly. While IP could estimate the impact of the incorrectly sized orifice plate, the fact that all of the plates were dirty for an extended period of time means the accuracy of those meters was also questionable, since dirty orifice plates can impact the accuracy of orifice meters.

I have seen no indication that from 1993 through 1999, when IP was having measurement error problems with its turbine meters, it was operating accurate orifice meters. This leads to the conclusion that none of IP's meters at the Hillsboro storage field were necessarily accurate during that time period. In short, IP had no means to accurately determine when the 5.8 Bcf shortfall occurred, which also means IP's estimate of the impact of this shortfall was not reliable.

In the instant proceeding (as well as my recommendations from the 2003 and 2004 reconciliations), I am pointing out that at the end of 1999 after the Peterson Report indicated to IP that it had measurement errors with its turbine injection metering, IP had in its possession the 1994 well chart information. When IP reviewed this same information in 2003, the information showed a 22.1% error in the amount of gas being measured. However, IP in 1999 instead of recognizing the existence of the well chart data based its measurement error estimate on the compressor logs information which indicated only a 5.4% error. However, as discussed previously, the use of compressor logs was suspect. Had IP compared those two values, it would have discovered a significant order of magnitude difference between the two. In short, after the completion of the Peterson Report, IP had in its possession information that showed it had a major inventory shortfall at Hillsboro, but IP failed to make use of it.

Q. Were the individual well meters at the Hillsboro storage field that formed the basis for the well chart calculations accurate?

A. I do not know the level of accuracy under which those meters operated. For example, the Peterson Report, page 17, indicated that for injection, the metering runs for the individual well meters were in general accordance with AGA Report #3, Part II, for the installed orifice plates. However, the Peterson Report also indicated that the production or withdrawal measurements from the meter should not be used as an engineering basis. From this, I gather that the individual well meters had decent accuracy measuring the volume of gas injected into the field, but were not reliable for use to make meaningful comparisons for withdrawal volumes.

Hillsboro's Withdrawal Orifice Meters

Q. What other problems has IP had with the Hillsboro storage field metering?

A. As noted above, IP had Peterson Engineering conduct a review of its Hillsboro Storage Field's metering. The Peterson Report, on page 4, noted that the orifice plates associated with the orifice meters at the North and South metering runs had not been pulled and inspected since their original installation. The Peterson Report also noted that there was an incorrectly sized orifice plate installed for the orifice plate at one location because the plate size stamped on the orifice plate was incorrect.

Q. Do you have any concerns regarding the problems that the Peterson Report found regarding the orifice meters?

A. Yes. In particular, I am concerned regarding the finding in the Peterson Report that IP had not pulled or inspected the orifice meters since installation. The Peterson Report was conducted during the fall of 1999. According to the Company's response to Staff data request ENG 1.64 (from Docket No. 04-0476), the incorrectly sized orifice plate was installed on September 20, 1993. I am assuming the other orifice meters were of a similar vintage. Thus it appears IP did not thoroughly inspect its orifice meters, used to measure its withdrawals from the Hillsboro storage field, for over 6 years, from 1993 through 1999.

Q. Has the Commission adopted any regulations regarding metering?

A. Yes. 83 Illinois Administrative Code Part 500, "Standards of Service for Gas Utilities" ("Part 500") contains the Commission's requirements for meter testing.

Q. Do the rules in Part 500 contain any requirements regarding orifice meters?

A. Yes. Section 500.180 (c) contains the rules that apply to orifice meters. These rules indicate the following:

> Each utility furnishing metered gas service through orifice type meters (flow meters) shall provide and have available an instrument for checking the diameter of the orifice, a water column for testing the pressure differential recorder, and a mercury column or an approved dead weight gauge tester for testing the static pressure recorded so that the utility will be capable of determining the accuracy of these orifices and recorders to within one-half of one percent. The orifices of these meters in service shall be inspected and calibrated at least annually, and the pressure instruments shall be calibrated at least monthly, which tests shall be in lieu of the requirements set forth in Section 500.210.

Q. Assuming that IP's maintenance standards for orifice meters used in its storage fields were at least as stringent as the Commission's minimum maintenance standards applicable to orifice meters used to measure customer load, what should have happened with respect to the orifice meters at IP's Hillsboro storage field?

A. An annual inspection of an orifice meter – as required by Part 500 for orifice meters used to measure customer load -- would include the physical removal, inspection, and measurement (verification of plate diameter) of the orifice plate. Therefore, if IP's maintenance standards for storage field orifice meters were consistent with the minimum requirements under Part 500 for customer load orifice meters, the problem with the incorrectly stamped orifice plate would have been found within one year, or in 1994, of the meter being set. Specifically, this problem would have been identified in 1994 (one year after installation) rather than 1999 (six years after installation), and IP would have found the error rather than an outside entity.

Q. Do Part 500 metering requirements apply to storage field metering?

A. No, Part 500 requirements do not apply to storage field orifice meters. However, while I am not suggesting that IP violated a Commission rule, the fact remains that these minimum requirements are reasonable for all orifice meters and IP's failure to meet this minimum standards is contrary to its obligation to provide safe, efficient and reliable service to its customers.

Q. Do you have any other concerns regarding IP's past practice regarding its orifice meters?

A. Yes. One of the reasons that Part 500 requires an annual inspection of the orifice meter is to ensure the orifice plate is clean and free of defects. In fact, the Peterson Report, on page 19, noted that the American Gas Association ("AGA") Report #3[3] states that "the plate shall be clean at all times and free from accumulations of dirt, ice, and other extraneous material", "the upstream edge of the orifice plate bore shall be square and sharp", and "upstream and downstream edges of the orifice plate bore shall be free from defects visible to the naked eye, such as flat spots, feathered texture, roughness, burrs, bumps, nicks, and notches."

The Peterson Report, pages 19-20, goes on to note that when the orifice plates were pulled and cleaned during the plant visit, the plant personnel reported that the South Field Primary Orifice Meter was very dirty and that the other plates were dirty to a lesser degree. Next, the Peterson Report noted that dirty plates can introduce significant metering errors, which can have a negative or a positive bias.

Another AGA publication also provides some basic guidance for inspecting orifice meters. The AGA Gas Measurement Manual, Orifice Meters, Part No. Three, contains under "Inspection Schedules" the following information:

[3] AGA Report #3 contains the guidelines for the installation of orifice meters.

The continued accuracy of an orifice meter state depends on keeping all of the station in proper operating condition. This depends on establishing and maintaining a fixed routine of inspection. Obviously, some items in a station should be inspected more often then others. Moreover, the inspection schedule for any station will depend upon many factors such as the importance of the station, the size in terms of gas flow, the location, the several types of equipment, company policies, etc. Therefore, the following is offered only as a guide to a minimum inspection schedule.

Primary Element

Orifice meter tubes should be removed annually for internal inspection and cleaning. This need may be satisfied by inspection caps where these are installed. Orifice plates should be removed and examined at least every three months.

Q. How does the above information apply to your current analysis?

A. The information contained in the AGA documents leads to the conclusion that IP did not place a high priority on accurate measurement for withdrawals from the Hillsboro storage field immediately after the expansion of the field. As was indicated above, the post-expansion volume of gas that IP wanted to cycle from the field was 7.6 Bcf. Given the large volume of gas that would pass through the meter, I would expect that IP would operate under more stringent inspection and testing guidelines.

Q. What recommendation did the Peterson Report make regarding Hillsboro's orifice meters?

A. The Peterson Report, page 4, recommended that the orifice plates be pulled, inspected, cleaned, and replaced, as necessary, at least annually and after process upsets and changes to ensure metering accuracy.

Q. In your opinion, why are there not any specific mandatory requirements for checking the orifice plate in an orifice meter in a storage field?

A. It is understood in the industry that in order to maintain accurate metering, frequent checking of the orifice plates is necessary. That is why the AGA guidelines that recommend quarterly inspections of the orifice plate are just guidelines. They provide the flexibility to match the circumstances faced by the user. For example, the Hillsboro storage field orifice metering in question in the proceeding only operate when the storage field is withdrawing gas. This only occurs during the winter months of November through March or April. It would not make much sense to review the operation of those meters quarterly when the meter only operates four or five months out of the year.

At a minimum, the Company should have checked the meters in late October or early November, depending on the usual timing on the withdrawal season at the Hillsboro storage field. In my opinion, another check on the orifice plate should also occur later in the withdrawal season. Depending on what the Company found historically during that second check (i.e. if no problems with plate found for five years running), then the Company could determine whether or not an annual orifice plate inspection was sufficient to ensure accurate measurement at the Hillsboro storage field. Conversely, if the Company had repeatedly found problems with the orifice plate on the second inspection, then more frequent inspections should be considered for those meters.

Q. What did the Peterson Report find regarding the orifice metering plates?

A. As noted above, the Peterson Report indicated that the orifice plates for the North and South metering station orifice meters had not been pulled since they were installed (a period of six years). The Study also indicated that when the plates were pulled the South Field primary orifice meter was very dirty and all other orifice plates were dirty to a lesser degree.

Q. What impact does a dirty plate have on an orifice meter?

A. The Peterson Report, page 20, indicated that dirty orifice plates can introduce a significant metering error and that the error could result in a positive or negative bias. The Peterson Report referenced a Nova Corporation Study that found a 3.3% measurement loss when grease was deposited on the orifice plate.

Further, in the paper "Effect of Various Conditions in Primary Element on Orifice Meter Measurement Table" by Roland Rollins, various impacts from potential problems with orifice meters were investigated. This paper demonstrated that very large errors (up to 27.4%) could exist under tests conducted with dirty orifice plates. While, I do not know how dirty or what the exact impact the dirty orifice plates had on IP's metering at Hillsboro, the fact that the orifice plates were dirty and had not been checked for six years meant that those meters were not accurate and had the potential for very large measurement errors.

Q. Have you previously raised the issue of inaccurate orifice metering at the Hillsboro storage field?

A. Yes. In response to my discussion, the Company indicated, in Docket No. 03-0699, that the withdrawal metering error, caused by the incorrectly sized orifice plate, was mitigating a portion of the injection metering error, such that if the Company had found the metering error earlier, it may have resulted in increasing the deliverability problem at the Hillsboro storage field.

Q. Do you agree with the Company's statement?

A. Yes. I agree that under the assumption that all of the orifice metering errors caused an overstatement, the correction of those errors would have likely resulted in the Hillsboro storage field experiencing deliverability problems at an earlier date. I also believe this would have caused the Company, if it had conducted a thorough review, to discover the inventory problems at Hillsboro at an even earlier date. This in turn would have lead to an even earlier recovery of the peak day and annual deliverability problems at the field.

Q. Did the Company make any other statements regarding the orifice metering errors?

A. Yes. The Company indicated that even if the withdrawal metering error had been discovered earlier, the Peterson Engineering metering audit would not have changed. The Company indicated that when the Peterson Report was conducted the Company was attempting to identify all possible causes of the Hillsboro deliverability issues and since the Peterson Engineering metering audit's purpose was to review all the metering and related processes at the

Hillsboro storage field, finding or not finding the withdrawal error would not have impacted that review.

Q. How do you respond?

A. I agree the scope of the Peterson Report may not have changed. However, unlike the actual situation where IP made the assumption that the injection and withdrawal errors offset each other, if IP had maintained accurate measurement at the orifice meters used to measure the amount of gas withdrawn from the field, then IP would have had to take a closer look into an appropriate estimate for the injection shortfall. The discovery of the injection metering error should have caused the Company to take a more thorough look, including the use of the available well chart information, to determine the potential volume of gas that resulted from that error. Had this been done, the Company should have discovered the large inventory shortfall at the field.

Q. Has the Company raised other topics with the orifice metering?

A. Yes. The Company, in Docket No. 03-0699, noted that the orifice plates that were installed in 1993 are still in service and that there are reasons for not removing and inspecting the plate of an orifice meter. Specifically, the Company indicated that the more frequently a plate is removed for cleaning, the greater the potential to damage the plate in handling or to reinstall the plate properly.

Q. How do you respond to these comments?

A. I am not surprised that the orifice plates are still in service. Normally, orifice plates are only taken out of service if physical debris has caused the plates to become bent or notched. Given the manner and the location in which the Company uses its orifice meters, the continued use of those plates is not unexpected.

However, I strongly disagree with the assertion that the orifice plates should not be inspected due to the potential for damaging the plate either through handling or the possibility that the plate could be reinstalled incorrectly. As noted above, all of the guidelines and standards for orifice meters discuss frequent inspection of the orifice plate. Obviously any concerns about damaging the plate in those documents are outweighed by the need to ensure accurate measurement by the meter. Further, during my tenure at the Commission (17+ years), which includes approximately 12 years of direct responsibility for ensuring utility compliance with the customer meter accuracy requirements of 83 Illinois Administrative Code Part 500, I have never heard it suggested that the orifice plate should not be inspected to avoid the potential for damaging the plate. In short, the purpose of a properly installed and maintained orifice meter is to accurately measure gas. However, if the plate is not inspected, then that meter can no longer be trusted to measure gas accurately.

Q. What does the above information tell you?

A. My conclusion from the above data is that IP did not place a high priority on accurate measurement for withdrawals from the Hillsboro storage field

immediately after the expansion of the field. IP failed to follow the minimum requirements from the AGA guidelines in order to ensure accurate measurement from its Hillsboro storage field.

Q. How does this information impact the prudence of the Company's actions regarding the Hillsboro storage field?

A. Had IP placed a higher priority on accurate meter measurement at the Hillsboro storage field, it could have found and corrected the orifice meter problem much sooner then it ultimately did. The earlier correction of the orifice metering error would have also allowed IP to focus solely on just the injection metering error when it conducted its 1999/2000 metering review.

Top Gas Volume

Q. Why is the volume of top gas that IP cycled from the Hillsboro storage field significant?

A. The volume of gas that a utility cycles from a storage field during the year provides an indication of the volume of top gas that is maintained by the field. As such, IP's actual operating experience with the field should have provided clues to the utility that it was experiencing an inventory problem.

As noted above, IP's testimony from Docket No. 04-0476 indicated that a significant observation was that the working gas volumes in the reservoir had declined to below the 3.1 Bcf. The Company stated that this observation indicated that the source of the deliverability problems for the expanded field was

not structural since the total working gas capacity of the field should have at least stabilized at 3.1 Bcf, but it did not.

This is significant because, as Table 1 above indicates, the last year that IP was able to cycle a gas volume in excess of 3.1 Bcf was the winter season of 1998/1999, when about 4.1 Bcf of gas was cycled. The Hillsboro storage field for the following two winter seasons (1999/2000 and 2000/2001) cycled only 3.0 Bcf and 2.9 Bcf, respectively, of its inventory. Obviously, the field for both years operated below the former 3.1 Bcf threshold, but the Company waited until 2003 to start returning the inventory shortfall.

Q. Has the Company previously commented about the top gas volume?

A. Yes. The Company indicated in Docket No. 03-0699 that the fact the Hillsboro storage field could not withdraw more than 3.1 Bcf in those years was not indicative that the gas volume at the field had declined below 3.1 Bcf or that there was no structural problem or cause. In particular, the Company noted that had the Hillsboro storage field's seasonal withdrawal capability stabilized at the pre-expansion level of 3.1 BCF, that could have indicated that all of the expansion gas that was injected, but it could no longer withdraw was being lost off structure. However, since the Hillsboro storage field's seasonal withdrawal capability declined below the 3.1 Bcf level, the possible cause of the Hillsboro deliverability problems remained ambiguous.

Q. Do you agree with the Company position?

A. No. The Company indicated that the expansion of the Hillsboro storage field increased the number of injection/withdrawal ("I/W") wells from 5 to 14. Further, the total volume of gas in the field (sum of working gas and base gas) went from 10.2 Bcf to 21.7 Bcf.

At the pre-expansion field, IP expected to cycle 3.1 Bcf in a normal winter. However, in my opinion, after the Company added 11.5 Bcf of total inventory and 9 I/W wells, the field's failure to cycle 3.1 Bcf, no matter what temperatures were experienced, is an indication that the field's operation had declined below its pre-expansion levels and was a large flag directing the Company to look into potential inventory shortfall problems. In essence, the Company missed another opportunity to identify a large inventory shortfall.

Furness #1 Well

Q. Why is the Furness #1 well significant?

A. As indicated above, IP drilled this well, in part, to verify the 3-D seismic survey analysis that it had received that indicated a separate sub-structure existed. However, this well, which was drilled in November 2000, invalidated the 3-D seismic survey results that indicated a separate sub-structure existed in that area. This fact, coupled with the above information should have caused the Company to determine that its problems at Hillsboro were not a reservoir problem, but were instead an inventory problem. Since the Furness #1 well information showed that no separate sub-structure existed in that area, some other problem (i.e. inventory) was causing the declines at Hillsboro.

Q. Could there have been some other problem at the field beside an inventory problem once the Furness #1 well indicated that no separate sub-structure existing in that area?

A. No. IP had eliminated every possibility except for inventory problems. In reality, the problems that IP was facing could have been caused by only a limited number of events. IP, with its access to observation well data and leak surveys, should have ruled out a structural or other gas leak as a cause of Hillsboro's problems. Further, IP's 1999/2000 metering error analysis had supposedly ruled out an inventory problem. Therefore, once the "reservoir problems" were ruled out, IP had to reinvestigate the other items, specifically the potential for an inventory error. As I discussed above, had IP conducted a thorough review, the inventory problem would have been recognized in early 2000. The drilling results from the Furness #1 well should have pointed IP squarely back to the actual problem, the inventory.

Q. Does the timing of the information obtained from the Furness #1 well correspond to your timeline for the start for replacing the inventory at Hillsboro during the 2000 injection season?

A. No. Since the Furness #1 well was not drilled until November 2000, it does not correspond to my recommendation that the Commission assume injections to replace the inventory shortfall start in the summer of 2000. However, it does mark another milestone for when IP should have discovered it was faced with an inventory problem and not a reservoir problem.

Q. The Furness #1 well being drilled in November 2000. If the Commission were to determine that the injection schedule should start in 2001 instead of 2000, how would this impact your recommendation adjustment in this proceeding?

A. It would have no impact on the amount of cost that I calculated that IP imprudently incurred because under either scenario, starting injections in 2000 or 2001, the Hillsboro storage field would have been filled prior to the 2005 reconciliation period. Therefore, there would be no change in the calculation.

Overall Storage Concerns

Q. Do you have any other information for the Commission to consider that would support a prudence disallowance at the Hillsboro storage field?

A. Yes. I have several overall concerns regarding the manner in which IP has operated its natural gas storage fields. I consider these concerns relevant to the discussion of the prudence of IP's actions, since IP has the responsibility to maintain the capabilities of its storage facilities. The information I discuss below lead me to the conclusion that IP has failed to fulfill that responsibility.

Q. What are your concerns and or observations regarding the manner that IP has operated its storage fields?

A. I have the following four concerns. First, IP has, in the past, taken the uncommon step of reducing the peak day capacity of both of its largest storage fields.

Second, IP has reduced the manpower levels associated with the oversight of its storage fields.

Third, the Company has reduced its capital spending at the storage fields below historical levels.

Finally, I provide several examples of the Company's inability to properly identify the root cause of storage problems and therefore, its inability to correct those problems.

Reduction in Peak Day Capacity

Q. When did IP reduce the peak day capacity of its Hillsboro and Shanghai storage fields?

A. The Hillsboro storage field, as noted above, was rated at 125,000 Mcf/day until it was reduced to 100,000 Mcf/day in 1999 and returned to 125,000 Mcf/day in November 2003. IP reduced the peak day capacity rating of the Shanghai storage field by 25,000 Mcf/day for the winter season 2001/2002.

Q. Why does the reduction in the peak day capacity at IP's storage fields concern you?

A. As I mentioned above, reducing the peak day capacity at a storage field is an uncommon event. During my 17+ year tenure at the Commission, I can recall only one other utility that reduced the peak day capacity of one of its storage fields. However, on that occasion, the basis for the reduced peak day capacity

dealt with the purposeful reduction in inventory at the field. Therefore, the fact that IP had to reduce the ratings at its two largest storage fields is not a positive indication of its management or oversight over those facilities.

Q. How are ratepayers impacted by a reduction in the peak day capacity of a storage field?

A. When a utility reduces the peak day capacity of a storage field, it must replace that capacity by contracting for additional peak day capacity and supply sources in order to meet its customers' demand requirements during the winter season. Generally, additional peak day capacity and supply resources are a more expensive alternative then providing storage gas. The cost for the replacement peak day capacity and supply sources is included in the PGA rates of the utility's customers. Therefore, a reduction in the peak day capacity of a storage field causes the utility to charge ratepayers a higher gas cost.

Further, a reduction in peak day capacity at a storage field also indicates there is some sort of problem at the storage field. When this incurs, the utility must make repairs, etc. to correct the problem. Depending upon the type of problem and the manner by which the utility must fix it, additional capital costs or increased operation and maintenance expense is incurred and could be passed on to ratepayers when the utility files for its next rate increase.

Q. Has the issue of a utility reducing its storage field's peak day capacity arisen in other dockets?

A. Yes. I addressed this issue in my testimony in Docket No. 01-0701 when I recommended an adjustment due to IP's reduction to the peak day capacity of its Shanghai storage field. In the surrebuttal testimony of Kevin Shipp (IP Exhibit 3.6, pages 22-23), IP presented certain data that contended that two other utilities appeared to have also reduced the peak day capacity of their storage fields in the past several years in order to contest my statement that the reduction of the peak day capacity of a storage field is an uncommon event.

Q. To the best of your knowledge, have any Illinois natural gas utilities other than the one instance discussed above reduced the peak day capacity ratings for their storage fields?

A. No. The data that IP noted in its surrebuttal testimony in Docket No. 01-0701 did show variations in storage field ratings; however, the variations that IP noted were caused by how the information was reported to the Commission. The physical ratings of the utilities' storage fields did not change during that period.

Manpower

Q. Have manpower levels at the Company's storage field operations changed over time?

A. Yes. According to the Company's response to Staff data request ENG 2.120 from Docket No. 01-0701 (received May 2002), which is an update of the Company's response to Staff data request ENG 2.80, from Docket No. 00-0714, the number of storage field operators has remained stable since 1991; however,

the number of storage field supervisors was significantly reduced from three or four supervisors from 1991 through November of 1995 to two persons at the end of 1995 and finally dropping to one person at the beginning of 2000. Further, not only did the number of supervisors drop in the early 1990s, but the remaining storage supervisor also had additional responsibilities added to his review, namely supervising the gas control/dispatch function of the company. (TR., 179-180, Docket No. 04-0677)

Q. Why did IP reduce the number of storage field supervisors?

A. According to the Company's response to Staff data request ENG 2.149 from Docket No. 00-0714, the Company, in 1995 and continuing through early 2000, implemented a review of its storage field operations to assure the continuance of safe, reliable and efficient operations. As a result of this review, IP determined that its storage field operations could be conducted in a safe, reliable, and efficient manner with one supervisor and by modifying the responsibilities of the operators and changing work practices.

Q. Do you agree with IP's contention that it can operate its storage operations in a safe, reliable and efficient manner with just one supervisor?

A. No. IP has reduced the peak day deliverability of its two largest storage fields in the past, which caused IP to incur additional gas costs. As I will discuss below with regard to the Hillsboro incident and discussed above regarding IP's Hillsboro metering investigation, IP conducts poor root cause analyses when reviewing storage problems. These events do not comport with IP's statement regarding its

ability to operate its storage fields in safe, reliable and efficient manner. If anything, the events suggest the opposite; that is, IP's reduction in oversight has caused it to operate its storage fields in a manner that is not safe, reliable, and efficient.

Q. Did IP make any other changes to storage personnel other than the supervisory ranks?

A. Yes. IP also reduced the number of technical personnel whose responsibility was the Company's storage fields. During the early 1990's IP had three engineers and one geologist whose responsibility was the storage fields. (TR., 179-180, Docket No. 04-0677) However, shortly after the Hillsboro storage field expansion in 1993, the number of engineers dropped to two and then dropped to one in 1996. (TR., 180-181, Docket No. 04-0677) The geologist retired in 2001. (TR., 186, Docket No. 04-0677)

Q. Has the issue of the oversight of the Company's storage operations been discussed in any other proceedings?

A. Yes. In Docket No. 04-0294, merger of Ameren and IP, the issue of adequate oversight of gas storage fields was raised. The Applicants' testimony (Applicants' Ex. 31.0, pages 2 and 3) specifically indicated that due to the concerns raised by Staff in Docket No. 01-0701 and in the merger proceeding, Ameren would, upon merger closing, establish a manager level position to lead its storage operation and would within six months of closing add additional engineering and supervisory personnel who would focus on storage activities and

responsibilities. This testimony also indicated that these personnel would be in addition to the existing storage personnel from the combined companies.

Q. What does this tell you?

A. The agreement to add additional personnel post merger may indicate that Ameren shared some of Staff's concerns regarding the level of oversight that IP had over its storage operations.

Capital Expenditures

Q. Has spending at the Company's storage field operations changed over time?

A. Yes. According to the Company's responses to Staff data request ENG 2.121 from Docket No. 01-0701 and ENG 2.81 from Docket No. 00-0714, the capital expenditure budget for storage operations indicates a significant drop in the amount of money being allocated. According to the Company's response to Staff data request ENG 1.19, Schedule 1.19-1 from Docket No. 04-0476, the capital expenditure amounts for storage projects for the years 2002 through 2004 combined were less than the amount that IP spent in either 2000 or in 2001. In fact, this response indicates that the years 2002, 2003, and 2004 account for three of the four lowest capital expenditure levels for gas underground storage plant for IP since 1995.

Q. Why have the capital expenditure levels dropped so dramatically?

A. According to the Company's response to Staff data request ENG 2.171, from Docket No. 01-0701, the capital budgets in the earlier years were much larger due to budgeting of specific large items to upgrade the storage fields.

Q. Does the above information about capital expenditures levels for the Company's storage operations cause some concern to you?

A. Yes. I am concerned that IP is being reactive rather than proactive when determining when to make upgrades or other improvements at its storage fields. A potential reason for a utility to behave in this fashion is that a utility will not earn a return on its investments for improvements or upgrades at its storage facilities until it requests and receives a natural gas rate increase from the Commission. In contrast, increased gas supply costs, unless deemed imprudently incurred, are automatically passed through to customers through the PGA. So IP could attempt to increase its gas operations profitability by reducing the amounts spent on its capital expenditures for its storage operations.

Q. Did you raise the above argument in Docket No. 01-0701?

A. Yes.

Q. Did IP dispute your contention?

A. Yes, it did.

Q. Do you have any additional information regarding that topic?

A. Yes. ***BEGIN CONF[4] [redacted]

[redacted]END CONF***

Q. What does the above discussion indicate to you?

A. The above information indicates that my original analysis and conclusion from Docket No. 01-0701 was accurate regarding IP's capital expenditures. Namely, that IP is unwilling to spend capital on its storage activities, which, in turn, has contributed negatively to IP's ability to maintain its storage operations.

Identification of Problems

Q. What has caused you to question IP's ability to identify problems or conduct thorough root cause analyses at its storage fields?

A. My concern is primarily based upon the problems that IP has encountered at its Hillsboro storage field. Various problems with the Shanghai storage field were discussed in Docket No. 01-0701, ICC Staff Exhibit 2.0, and need not be repeated here. Below, I detail the concerns that I have regarding (1) IP's

[4] Ameren has asserted a privilege for this information.

investigation into an incident on December 16, 2000 that completely shut down the storage field for a short time and further reduced its peak day capacity for about one month after the accident and (2) IP's ability to track its gas usage.

Hillsboro Incident

Q. What is the December 16, 2000 incident at the Hillsboro storage field?

A. According to the Company's responses to Staff data requests ENG 2.60, 2.68, and 2.79 revised from Docket No. 00-0714, at approximately 11:45 p.m. on December 16, 2000, a 50,000 gallon produced water tank (Tank T-402) at IP's Hillsboro storage field exploded, launching the tank approximately 275 feet and causing it to land on top of the storage field's regulator building causing extensive damage to all equipment contained within the building. Natural gas withdrawals from the Hillsboro storage field were stopped at this time and did not resume until December 21, 2000, at which time the field could provide only 65,000 MMBtu or 65 percent of its present rated capacity. The field was returned to its 100,000 Mcf/day rating on January 26, 2001.

Q. What is a produced water tank?

A. When gas is withdrawn from an aquifer storage field, water must be removed from the gas prior to putting it into IP's natural gas system. Dehydration of the gas at Hillsboro is accomplished by passing the gas through a gas-water separator, into pre-heaters, then finally into a glycol dehydration system. The

water removed from the gas by the gas-water separator is called produced water. This produced water is stored in the produced water tank.

Q. What is a gas-water separator?

A. A gas-water separator is a device that removes free water from the gas stream. Free water is water that is physically present within the gas stream in a liquid state. Simply stated, a separator is a longitudinal tank that contains baffles. Gas withdrawn from the storage field enters the separator at one end and as it moves through the separator the baffles knock the free water out of the gas stream, once the water is removed from the gas stream it is called produced water. This produced water accumulates at the bottom of this tank. Once the water reaches a certain level, the dump valve on the tank is activated, allowing a portion of the produced water to leave the tank.

Q. Was an analysis of the accident performed?

A. Yes. IP hired Packer Engineering ("Packer") on December 18, 2000, to conduct an investigation into the incident in order to determine, if possible, the origin and cause of the explosion. Packer issued a report, dated February 14, 2001, about its investigation.

Q. What did the Packer report conclude regarding the Hillsboro incident?

A. Packer determined that the cause of the explosion was the over-pressurization of Tank T-402. In fact, Packer determined that the tank, which is normally at

atmospheric pressure, was pressurized to approximately 5 pounds per square inch ("psi") in order for the tank to have sufficient energy to travel 275 feet.

The Packer report stated the explosion resulted from the rapid build-up of high-pressure gas within the tank. The report further noted the 24-inch manway, which is used for emergency pressure relief, from Tank T-402 was frozen shut due to the accumulation of snow and high winds that contributed to the event by not allowing the emergency relief to release the gas pressure from within Tank T-402.

Q. Does the Packer report state the cause of the over-pressurization of Tank T-402?

A. The report does not go into the specific causes of the over-pressurization; however, the report does note that at the time of the incident an IP employee was manually operating the dump valve[5] on a gas-water separator (S-301). The report further noted that it was possible to generate a pressure of 5 psi within Tank T-402 by allowing the high-pressure gas from the gas-water separators to enter the tank.

Q. Did IP agree with the conclusions of the Packer report?

A. Not completely. IP's response to Staff data request ENG 2.136 from Docket

[5] A dump valve controls the flow of produced water out of the separator by controlling the opening and closing of the water line that runs to the produced water tank.

No. 00-0714 noted, "The contributing factors that resulted in the over-pressurization of Tank 402 are still being investigated. IP hasn't established a "position" on what caused the over-pressurization…"

Q. How is the water within a separator normally removed?

A. A separator normally releases produced water after an actuator responds to a float contained within the separator. Once the float reaches a certain level, the separator's dump valve is activated allowing for the release of water until the float reaches its lower limit which then causes the actuator to signal the dump valve to close.

Q. What are the water levels within separator S-301 that cause the dump valve to automatically activate and to de-activate?

A. I asked IP that question in Staff data request ENG 2.72 in Docket No. 00-0714, but IP responded that those levels had not been determined.

Q. When did IP respond to ENG 2.72 in Docket No. 00-0714?

A. IP's response was provided on April 12, 2001.

Q. Was IP able to provide any estimates on the amount of time it would take to empty separator S-301 of specific amounts of produced water?

A. Yes. I requested in Staff data request ENG 2.132 in Docket No. 00-0714 for IP to assume that separator S-301 held 100 gallons, 50 gallons and 25 gallons of produced water and to then calculate the amount of time it took to remove that

amount of water through the dump valve using the same conditions as those present on December 16, 2000. IP's calculations show it would take 43.5, 21.7, and10.9 seconds, respectively, to move those amounts of water.

Q. How is separator S-301 connected to Tank T-402?

A. According to the Company's response to Staff data request ENG 2.60 from Docket No. 00-0714, separator S-301 is connected to Tank T-402 via a 250-foot section of 2-inch line.

Q. What is IP's estimate of the amount of time it would take for the pressurized gas to travel from separator S-301 through 250 feet of 2-inch pipe to Tank T-402?

A. According to the Company's response to Staff data request ENG 2.163 from Docket No. 00-0714, IP estimated it would take about one second for pressurized gas to travel from separator S-301 to Tank T-402.

Q. If pressurized gas reached Tank T-402, what means does that tank have for relieving itself of that pressurized gas?

A. According to the Company's response to Staff data request ENG 2.60 from Docket No. 00-0714, Tank T-402 contains three means of providing itself pressure relief, a 24-inch manway with a flapper type lid for emergency relief, a 6-inch diameter vent line, and a 3-inch diameter overflow opening.

Q. Did IP make a calculation of the amount of time it would take for Tank T-402 to reach a pressure of 5 psi assuming the pressurized gas came from the same

separator (S-301) that its employee was operating at the time of the Hillsboro incident and assuming the 24-inch manway was frozen shut?

A. Yes. I requested IP provide this calculation in Staff data request ENG 2.133 from Docket No. 00-0714. IP, in its revised response, calculated that it was not possible for Tank T-402 to reach 5 psi even assuming the 24-inch manway was frozen shut assuming the 6-inch and 3-inch openings were fully functional.

Q. When did IP become aware of the relief capacity of Tank T-402 versus the ability of separator S-301 to pressurize the tank?

A. IP learned of this as a result of Staff's data request ENG 2.133 (from 00-0714), which asked for the amount of time it would take to pressurize the produced water tank to 5 psi assuming the separator was flowing gas instead of produced water through the water line. Staff noted an error in a calculation in the Company's original response to Staff data request ENG 2.133 and spoke to the Company about this on May 21, 2000. As a result of this conversation, IP provided a revised response on May 22, 2000. My understanding is that the Company did not realize prior to the preparation of its revised response that the relief capacity of the 6-inch and 3-inch openings on Tank T-402 were sufficient to relieve the pressure built up (assuming the pressurized gas from releasing gas from the dump valve on separator S-301 and that the 24-inch manway was inoperable).

Q. Does the timing of IP's responses and of its knowledge of the incident surprise you?

A. Yes. Given IP's comments that it was still investigating the incident even after the Packer report, I would have assumed a calculation of the amount of time to cause the explosion would be an area investigated. In fact, the relief capacity of Tank T-402 versus the capacity of separator S-301 to increase the tank's internal pressure is a fairly basic starting point.

Q. Did any other entities issue reports regarding the Hillsboro incident?

A. Yes. The Illinois Commerce Commission's Office of Pipeline Safety provided IP with an Incident Report. This report noted in its conclusion that one of two scenarios caused the tank to overpressurize. First, the report stated that although it would be highly unusual, it was possible for the freezing rain condition, strong winds and cold temperatures that occurred on that night to have caused ice to form on the outside of the tank, preventing the flapper on the manway from functioning properly. In order to overpressure the tank, ice would also have to seal off most of the 6" vent line. However, the report noted that the freezing rain that occurred the night of the incident was not considered significant. It stated that there were no downed power lines or power outages resulting from the freezing rain.

The second scenario presented in the report was that the high-pressure gas had been bubbling up through the water in the tank for some time, a lot longer than the amount of time described by the plant foreman. The splashing water and foaming conditions may have caused ice to form on the cold metal walls of the inside of the tank blocking off the 6" vent line and sealing the flapper closed.

Q. What conclusions have you made regarding IP's response to the Hillsboro incident?

A. IP failed to properly investigate the root cause of the problems at Hillsboro. It took Staff's prompting five months after the incident for the Company to determine the produced water tank should have had sufficient relief capacity to vent pressurized gas once it entered the produced water tank from the separator. The inability to make the basic discovery is a reflection of the poor management oversight that IP has over the safe, reliable, and efficient operation of its storage fields. IP's inability to operate its storage in a safe, reliable, and efficient manner results in additional costs for its ratepayers.

Q. How has the Company responded to this argument in the past?

A. The Company in Docket No. 03-0699 indicated that it disagreed with my assessment and noted that IP promptly hired Packer Engineering to conduct an investigation and that the Packer report concluded the failure of the emergency relief on the produced water tank caused the explosion.

The Company noted the various corrective actions that were implemented as a result of the Packer Engineering Report. The Company also indicated that some of the hypothetical assumptions contained within my 03-0699 testimony (also repeated above) were not necessarily supported by the physical plant findings.

Q. How do you respond to the Company's statements?

A. I agree that IP promptly hired Packer Engineering for the purpose of determining the origin and cause of the explosion of the produced water tank. I also agree that IP implemented several corrective actions as a result of the Packer Engineering Report. However, I do not consider the Company's actions as an indication that the Company was proactive in its root cause analysis.

Q. Why do you reach the conclusion that the Company was not proactive in its root cause analysis regarding the explosion of the produced water tank?

A. The Company only had Packer Engineering determine the cause of the produced water tank explosion. I have seen no indication that IP followed up with any review to determine what set of events allowed or caused the separator to release high pressure gas into the produced water tank in the first place. As I noted above, IP indicated "The contributing factors that resulted in the over-pressurization of Tank 402 are still being investigated. IP hasn't established a "position" on what caused the over-pressurization…"

I consider the factors that lead to the over-pressurization as the real root cause problem with the Hillsboro Incident; however, I have not seen any indication that IP conducted any further studies regarding that topic. Therefore, I continue to support my original conclusion that IP's investigation into this event was lacking.

For example, if a car hits a tree a reasonable question to ask is why did that happen? If the response is that a brake failure caused the accident, in my opinion, further questions would also need to be asked. For example, did the

brakes fail due to improper maintenance, or were they past their useful life, or etc.

One of the purposes of the root cause analysis is to enable the Company to avoid similar accidents in the future. Coming up with only part of the reason for why something happened is not consistent with a thorough root cause analysis.

Q. The Company also indicated that the hypothetical information provided in Staff data request responses was not necessarily consistent with the physical findings the facility. How do you respond?

A. While I do not dispute the fact that some liquids were found in the separator when the unit was inspected, this does not conclusively establish that the separator was not the source of the overpressure situation. If it were not, then why was this separator selected by the Company for inspection after the event? Also, the Packer Report indicated that the probable cause of the failure of the water tank was the manual operation of the separator dump valve by the plant foreman. Further, the reason Staff sent the data requests requesting "hypothetical" information was the Company's failure to conduct any of its own analysis, which forced Staff to provide very specific examples in order to obtain any information about what could have happened at that incident.

Finally, I would also point out that if the separator in question was not the source, then that is even more reason why IP should investigate the events further. The original equipment prior to the Hillsboro Incident was designed to not explode,

but it happened anyway. Without conducting a thorough review of what actually happened, IP cannot be assured that it took appropriate corrective actions.

Gas Dispatch Tracking

Q. How does IP track the volume of gas it receives from the interstate pipelines?

A. According to the Company's response to Staff data request ENG 1.52 from Docket No. 04-0476, IP tracks the volume of gas received from the pipelines through its SCADA/EMS systems. The response also notes that IP had telemetry at 52% of its pipeline delivery stations, but those stations deliver about 95-98% of the total gas from the pipelines.

Q. What volume of natural gas did IP ultimately determine it had failed to measure at its storage fields?

A. According to the Company's response to Staff data request ENG 1.48 from 04-0476, IP estimated the following net numbers, shown in Table 2, for its Hillsboro and Shanghai storage fields:

Table 2

Estimated Measurement Error

	Hillsboro	Shanghai	Total
1994	-1,518,536	0	-1,518,536
1995	-1,065,769	-51,771	-1,117,540
1996	-933,890	-181,759	-1,115,649
1997	-784,504	-184,229	-968,733
1998	-869,654	-182,597	-1,052,251
1999	-734,089	-143,220	-877,309
Total	-5,906,442	-743,576	-6,650,018

Source: Company Response to Staff data request ENG 1.48 from 04-0476

Q. What conclusions or observations can you make from this information?

A. Even though IP has significant measurement errors that primarily occurred during the injection months when gas usage is the lowest, its load forecasting and dispatch group failed to notice an extra Bcf or more of gas entering its system every year for 6 years. Again, it is another example of IP's failure to adequately oversee its operations.

I reach this conclusion because IP tracks its pipeline deliveries at many different locations. For example, for just the Panhandle Eastern Pipe Line Company, IP tracks the deliveries it receives at ten different gas stations. IP's dispatch center receives telemetered data related to those gas deliveries every 4 to 8 seconds. IP also tracks its usage from the other interstate pipeline gate stations (interconnection points between IP and interstate pipeline) into its system from its dispatch center. Finally, there are only a few gate stations that can provide gas supplies to the Hillsboro storage field. Therefore, IP was tracking or should have

been tracking its delivery amounts from its various gate stations and errors of the magnitude that IP experienced should have been detected.

Q. How has the Company responded to this argument in the previous PGA proceedings?

A. The Company indicated that a 1 Bcf of gas would equate to about 4,000 Mcf per day assuming an equal injection pattern throughout the injection season. The Company then indicated that during the shoulder months of April, May, October and November, the purchase volume runs around 300,000 – 400,000 Mcf. Next, the Company stated that a 4,000 Mcf error during that time period would not stand out as a significant error. (IP Ex 2.2, pp. 23-24, Docket No. 04-0677)

The Company noted that the measurement errors would not be noticeable in part because the 4,000 Mcf per day would not stand out, but also because the volumes of customer-owned gas also enter the system at the same time as sales customer's deliveries. Therefore, IP would not have noticed the measurement errors through its dispatch center or load forecasting group. (IP Ex. 2.2, p. 23)

Q. Do you agree with the Company?

A. No. The Company over simplifies the problem. The Company provided the daily throughput volumes for IP's system for the period July 7, 2003 through July 13, 2003. This data indicated that the system throughput for non-transportation customers was about 294,874 therms. The 4,000 Mcf/day value provided by the Company is roughly equivalent to 40,000 therms/day, which means that the Company during the summer months was seeing a customer load forecasting

error for its customers in excess of 13%. A utility should be aware of errors of that magnitude regarding its forecasting and dispatch.

Further, the 4,000 Mcf/day value is also understated. Using a 6-month time injection period and then using the 1.5 Bcf measurement error (the largest value shown on Table 2 above) instead of the 1 Bcf error on which the Company based its original arguments, the average daily error on Hillsboro injection readings would exceed 8,000 Mcf/day (1.5 Bcf / 180 days)[6]. Comparing this value to the 29,500 Mcf non-transportation customer deliveries in July shows a potential error in excess of 27% (8,000/29,500). Staff would expect a utility would be aware of errors of that magnitude regarding its forecasting and dispatch.

Further, the Company admitted that its large customers have daily meters that allow it to track their usage on a daily basis on an after-the-fact basis. (TR., 148 – 150, Docket No. 04-0677) IP tracks transportation customer usage because it conducts an after the fact comparison of its transportation (customer-owned gas) customers on a daily basis to compare their nominations versus actual usage. (TR., 155, Docket No. 04-0677) Therefore, IP had the after-the-fact ability to remove the transportation volumes from its daily takes. This also means that IP then had the potential to back out of its daily deliveries everything except its sales customers usage, meaning IP then had the opportunity to observe, if it had been looking, a 27% error between its sales customer's forecasted use and actual deliveries.

[6] Using 1.0 Bcf and 180 days would equate to an average error of about 5,600 Mcf/day.

Conclusion of Overall Storage Concerns

Q. What does all of the above information regarding your concerns about IP's overall storage operations indicate to you?

A. The above information tells me IP's actions over several years contributed to the problems that IP encountered at the Hillsboro storage field. First, it is very uncommon for a utility to reduce the peak day capacity of a storage field, yet IP has previously reduced the peak day capacity of both of its largest storage fields, Shanghai in 2001 and Hillsboro in 1999.

Second, IP reduced the manpower levels associated with the oversight and technical review of its storage fields, especially immediately after it expanded the Hillsboro storage field. After reducing its manpower levels, IP's ability to identify and act upon problems at its storage fields declined.

Third, the Company reduced its capital spending at the storage fields below historical levels. This may indicate that IP is being reactive rather than proactive when determining when to make upgrades or other improvements at its storage fields. A potential reason for a utility to behave in this fashion is that a utility will not earn a return on its investments for improvements or upgrades at its storage facilities until it requests and receives a natural gas rate increase from the Commission. However, increased gas supply costs resulting from this behavior, unless deemed imprudently incurred, are automatically passed through to customers through the PGA.

Finally, the events surrounding the Hillsboro incident and metering review discussed above indicate that the Company's poor oversight does not allow IP to properly identify and act upon the various problems facing its storage operations. IP's inability, or more accurately, unwillingness to operate its storage in a safe, reliable, and efficient manner also causes its ratepayers to incur additional costs. Therefore, IP should be held accountable for its actions, or lack thereof, and the additional costs that IP incurred as a result of the Hillsboro storage field not operating at its full capacity should be found imprudent.

Dynegy Indemnification

Q. Aside from the above information, do you have any other information that you believe is pertinent to this PGA proceeding?

A. Yes. It is apparent that Ameren, prior to acquiring IP from Dynegy, was aware of the problems that IP had experienced at its Hillsboro storage field. In fact, Ameren was so concerned about the manner in which IP and Dynegy had operated the field that it included an indemnification clause in the February 2, 2004 Stock Purchase Agreement among Ameren Corporation, Illinova Generation, Illinova Generating Company and Dynegy Inc. Specifically, under Article IX INDEMNIFICATION, Section 9.1 (g), page 79, the document states, in part, the following:

> any net refund of amounts under IPC's purchased gas adjustment ("PGA") rider ordered by the ICC, whether effected by adjustment of any PGA factor or otherwise, in any PGA reconciliation proceeding relating to any portion of the period from January 1, 2001 to December 31, 2004, to the extent that payments or PGA

> adjustments required to be made by IPC pursuant to such order exceed the reserve established for potential liability in such proceeding as reflected in the calculation of the Final Adjusted Working Capital; or any disallowance by the ICC of IPC's gas costs or investment relating to events prior to the Closing at the Hillsboro gas storage field whether such disallowance shall be provided for in any PGA case ("working gas") or in a gas rate case ("cushion gas"), but only to the extent that such disallowance is not due to any imprudence by IPC after the Closing; provided, however, that the Seller Indemnitors' liability under this Section 9.1(g) with respect to any such refund or disallowance shall be equal to 50% of such refund or disallowance.

Q. What does the above statement mean to you?

A. My understanding is that should the Commission determine that IP's actions or lack thereof regarding its Hillsboro storage field were not prudent through the end of calendar year 2004 (assuming IP took or failed to take those actions prior to the closing of the Acquisition of IP by Ameren), then IP is only responsible for paying half of the prudence disallowance with the other half being paid by Dynegy.

Overall Conclusion

Q. What does all of the above information mean to you?

A. The Company's actions were imprudent because it failed to identify a large inventory shortfall at the Hillsboro storage field and begin replacing it in a timely fashion.

In the early 1990s, the Company decided to expand its Hillsboro storage field; a project that the Company completed in 1993. However, at about the same time as the project completion, the Company determined it could significantly reduce

the number of supervisory and technical personnel associated with its storage operations. Further, the remaining storage supervisory person also had other responsibilities added to his job requirements. I consider it unreasonable for the Company to reduce the supervisory and technical personnel, increase the assigned duties of the storage supervisory person, and at the same time, expand storage operations. Each of these circumstances was known to Company management and under their control. The Commission should find that these actions were imprudent.

The lack of supervisory and technical personnel is evident in the Company's operation of the Hillsboro storage field at the time it had the Peterson Report conducted (end of 1999 and beginning of 2000). The Company had available to it in 2000 the individual well chart data from 1994 that would have allowed it to make a comparison of volumes shown by its injection metering to the individual meter well charts in order to determine an estimate of the metering shortfall. Instead of making this calculation in 2000, the Company used unsupported assumptions regarding the field's compressor loading rates to conclude that the injection and withdrawal metering errors essentially offset each other. However, when the Company finally made a comparison of the well charts to the injection metering in 2003, the information indicated a variance of 22% instead of the 5.4% the Company had calculated in 2000 from the use of the compressor loading assumptions.

The Peterson Report also discovered multiple problems with the field's orifice meters used to measure the amount of gas withdrawn from the field. In

particular, the Peterson Report found that the orifice plates had not been inspected since they were installed (a period of six years) and that one of the plates was incorrectly marked resulting in the wrong size of plate being installed. This indicates to me that the Company did not place a high priority on accurate measurement from its Hillsboro storage field due to its failure to follow any inspection criteria for orifice meter plates even though it is well understood in the industry that those plates are integral to the accurate measurement from that type of meter and the AGA guidelines expressly recommend it.

Had the Company inspected its orifice plates, it should have found the problems associated with those plates and corrected them. This in turn would have allowed the Company to accurately measure the amount of gas withdrawn from the field. Having accurate measurements of gas withdrawn from the field would have also allowed the Company, at the time of the Peterson Report, to concentrate on the true magnitude of the injection metering error, instead of having the opportunity to reach a conclusion based on unfounded assumptions that the injection and withdrawal metering errors basically offset one another.

The Company also failed to recognize the significance of the field's failure to cycle 3.1 Bcf. This was an indication that the field's operation had declined below its pre-expansion levels and was a large flag directing the Company to look into potential inventory shortfall problems.

I also detail above two examples where the Company failed to conduct thorough root cause analyses; namely the Hillsboro Incident and the Gas Dispatch Tracking events. These examples support my conclusion that the Company was

not performing thorough root cause analyses of the problems on its system and was indicative of the problems of trying to do more work with fewer personnel. In general, the Company failed to conduct thorough root cause analyses of the problems at its Hillsboro storage field and to maintain all of the metering at the field in a prudent fashion.

The Company's decision to greatly reduce its supervisory and technical storage personnel after it had completed the Hillsboro expansion project was a contributing factor that manifested itself through (1) the Company being reactive versus proactive; and (2) failure to conduct thorough root cause analyses of various problems with the fields or other areas within the Company. The ultimate result was that IP is the only Illinois utility to reduce the peak day capacity of two of its storage fields. The review of all of the material leads me to conclude that IP acted imprudently when it failed to find and act upon the inventory shortfall at the Hillsboro storage fielding a timely fashion.

Q. Does this conclude your direct testimony?

A. Yes, it does.

Seasonal Storage Adjustment

		January	February	March
1	Full Cycle	1,781,569	1,541,108	1,224,741
2	Weather Adjustment	1.023	0.761	0.932
3	Pro-rated Cycle	1,822,545	1,172,475	1,141,949
4	2005 Actual	1,130,142	1,087,065	864,702
5	Difference	692,403	85,410	277,247
6	Per Unit Savings	0.8077	0.8734	1.2781
7	Monthly Benefit	$559,254	$74,597	$354,349
8	Total Seasonal Benefit	$988,200		

Row 1 = Inventory IP cycled from Hillsboro in winter season of 1993-1994
Row 2 = Per Company Response to Staff data request 1.58
Row 3 = Row 1 * Row 2
Row 4 = Per Company response to Staff data request ENG 1.5
Row 5 = Row 3 - Row 4
Row 6 = ICC Staff Exhibit 2.0, Schedule 2.0
Row 7 = Row 7 * Row 8
Row 8 = Sum of Row 7

Seasonal Storage Benefit

		January $/DTH	February $/DTH	March $/DTH
1	Gas Commodity	6.4167	6.4984	6.9311
2	Gas Storage	5.6090	5.6250	5.6530
3	Storage Savings	0.8077	0.8734	1.2781

Row 1 = Per Company Response to Staff Data Request ENG 1.57
Row 2 = Per Company Resopnse to Staff Data Request ENG 1.56
Row 3 = Row 1 - Row 2