Docket No. 01-0701
ICC Staff Exhibit 2.00

UNREDACTED

DIRECT TESTIMONY

OF

ERIC LOUNSBERRY

Engineering Department
Energy Division
Illinois Commerce Commission

Purchased Gas Adjustment Clause Reconciliation

Docket No. 01-0701

Illinois Power Company

July 3, 2002

Docket No. 01-0701
ICC Staff Exhibit 2.00

Table of Contents

Q. Please state your name and business address.

A. My name is Eric Lounsberry and my business address is: Illinois Commerce Commission, 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 the Gas Section Supervisor of the Engineering Department of the Energy Division. I have worked for the Illinois Commerce Commission since 1989.

Q. Please state your educational background.

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 University of Illinois at Springfield).

Q. What are your primary responsibilities and duties as the Gas Section Supervisor 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 of 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 7, 2001, the Commission initiated its annual reconciliation of the Purchase Gas Adjustment ("PGA") for fiscal year 2001, as filed by Illinois Power Company ("IP" or "Company"), pursuant to Section 9-220 of the Illinois Public Utilities Act ("Act"). This investigation was initiated to determine whether IP's PGA clause reflects actual costs of gas and gas transportation for the twelve-month period ending December 31, 2001, and whether those purchases were prudent.

Q. What are your duties and responsibilities associated with this docket?

A. My assignment is to determine if IP's natural gas purchasing decisions made during the reconciliation period were prudent.

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

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

Schedule 2.01	Summary of Adjustments
Schedule 2.02	Freeburg Propane Adjustment
Schedule 2.03	Shanghai Adjustment
Schedule 2.04	Gas Storage Expenses and Expenditures

Q. Have you made a determination as to whether IP's natural gas purchasing decisions were prudent?

A. Yes. Using the Commission's criteria for prudence, I have determined that not all of IP's natural gas purchasing decisions were prudent. In particular, I recommend the Commission find the $370,000 in additional gas costs that IP incurred as a result of its decision to reduce the peak day capacity of its Shanghai gas storage field imprudent. There are also two adjustments for imprudently incurred gas costs due to the Commission's finding regarding the prior reconciliation period, Docket No. 00-0714. The Commission found the Company imprudent in Docket No. 00-0714 as a result of its decision to retire the Freeburg propane facility and its method of selecting certain swing firm supply reservation contracts. I calculated that IP imprudently incurred gas costs of $614,000 and $2,000, respectively during the instant reconciliation period as a result of those decisions. Based upon my review of the above topics, I recommend the Commission make a total downward adjustment of $986,000, to IP's PGA gas cost. This calculation is shown in ICC Staff Exhibit 2.00, Schedule 2.01.

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 circumstances encountered by utility management at the time decisions had to be made. In determining whether or not a judgment was prudently made, only

> those facts available at the time the 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'. (Docket No. 84-0395, p. 17.)

Docket No. 00-0714

Q. Did the Commission find any decisions reached by the Company during prior reconciliation periods to be imprudent?

A. Yes. In the November 27, 2001, Order in Docket No. 00-0714, page 35, the Commission found the following:

> the evidence shows that for the calendar year 2000 reconciliation period, Illinois Power acted reasonably and prudently in its purchase of natural gas, **except with regard to its decision to retire its Freeburg propane plant and its method for selecting swing firm supply reservation contracts;** (emphasis added)

Freeburg Propane Plant

Q. Does the Commission's finding that IP did not act reasonably and prudently regarding the decision to retire the Freeburg propane plant have any impact upon the costs incurred by the Company during the reconciliation period at question in the instant proceeding?

A. Yes. As shown in ICC Staff Exhibit 2.00, Schedule 2.02, IP incurred an additional gas cost of $614,000 during the reconciliation period.

Q. How did you calculate this value?

A. The $614,000 adjustment was calculated in two parts. The first part involved a continuation of the replacement gas costs that was ordered by the Commission in IP's reconciliation in Docket No. 00-0714. In Docket No. 00-0714, the Commission assumed IP incurred replacement gas costs from April 2000 (the date of the facility retirement) through December 2000. In order to be consistent with the prior Order, I assumed the same replacement gas cost would hold through March 2001. The reconciliation period at question during this proceeding is the calendar year 2001.

I also assumed the Company would purchase seasonal transportation and supply contracts to replace the Freeburg capacity after March 2001, meaning IP would also incur replacement gas cost in November and December of 2001. Pricing information on cost for seasonal transportation and reservation contracts for the months of November and December was provided in the Company's response to Staff data request ENG 2.106.

Q. What reasoning did the Commission use in Docket No. 00-0714 in finding the Company's decision to retire the Freeburg facility imprudent?

A. The Commission's conclusion regarding the Freeburg issue starts on page 16 and ends on page 20 of the November 27, 2001, Order. However, the main conclusion within the section states as follows:

> The Commission determines that the significant PVRR savings from the continued operation of the Freeburg propane plant of $5,297,160 for the 30-year period and $3,942,149 for the 15-year period outweigh the concerns about the safety and reliability of the

plant identified by IP as the plant continues to age. Therefore, the Commission concludes that IP's decision to retire the Freeburg plant in April 2000 was imprudent.

Swing Contracts

Q. Does the Commission's finding that IP did not act reasonably and prudently regarding the method used to select swing firm supply reservation contracts have any impact upon the costs incurred by the Company during the reconciliation period at question in the instant proceeding?

A. Yes. The Company's response to Staff data request ENG 2.82, indicated that IP incurred an additional $2,000 in gas costs during the instant reconciliation period as a result of entering into a contract whose selection was based solely on the contract's reservation fee without consideration of potential higher commodity costs associated with it. A similar adjustment was also made for this same contract in Docket No. 00-0714.

Q. What reasoning did the Commission use in Docket No. 00-0714 in finding the Company's decision to enter into swing contracts whose selection was based solely on the contract's reservation fee without consideration of potential higher commodity costs imprudent?

A. The Commission's conclusion regarding IP's practice of awarding swing firm supply contracts on the sole basis of lowest reservation costs is discussed on pages 33 and 34 of the November 27, 2001, Order. However, the main conclusion within the section states, on page 34, in part, as follows:

The Commission concludes that IP's practice of awarding swing firm supply contracts for the 2000-2001 winter season on the sole basis of lowest reservation costs was imprudent. IP should have also considered commodity costs in awarding such contracts.

Shanghai Storage Field

Q. Aside from the Commission's finding of imprudence from the prior reconciliation period, did you identify any other areas of the Company's reconciliation where you found imprudent actions?

A. Yes. The Company reduced the peak day rating of its Shanghai storage field by 25,000 Mcf/d during the reconciliation period. I found this action to be imprudent and calculated that the Company incurred an additional cost of $370,000, as shown in ICC Staff Exhibit 2.00, Schedule 2.03.

Q. Why do you believe the reduced peak day rating of the Shanghai storage field is imprudent?

A. I have several reasons for finding the reduction in the Shanghai storage field imprudent. These are broken down into two main areas: IP's actions that relate directly to the Shanghai storage field and IP's actions regarding its storage operation overall. My overall conclusion is that IP should have identified and acted upon potential deliverability problems at the Shanghai storage field prior to encountering the need to reduce the peak day capacity of the field.

The Shanghai specific items include the fact that IP was aware that wells at aquifer storage fields experience deliverability declines, but the Company was

not adequately monitoring the field to proactively react to any potential problems. IP used various methods to conduct inventory verification at the Shanghai storage field, but it failed to discover the loss of 18.5% of the field's top gas. IP had other opportunities to observe the potential loss of gas from Shanghai, but failed to capitalize on those opportunities. Once IP found a metering error at Shanghai, it waited over a year to replace the lost gas. IP has not performed any capital improvement projects at the Shanghai field to maintain the field's peak day deliverability since 1994.

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 conduct thorough root cause analyses. All of these areas contributed to the Company's action of derating the Shanghai storage field and increased the Company's gas costs during the reconciliation period. These areas are discussed below in more detail after the discussion of the specific causes of the Shanghai derating.

Q. What is deliverability?

A. Deliverability is a measure of the rate at which the storage gas can be sent to its market. It is also the rate at which the pipeline gas can be injected into the storage field.[1]

[1] Natural Gas Underground Storage: Inventory and Deliverability, M. Rasin Tek, Penwell Publishing,

Specific Shanghai Items

Q. What is the Shanghai storage field?

A. The Shanghai storage field is an aquifer storage field. An aquifer is a water-bearing porous geologic structure. Under certain conditions, it is possible to convert this porous geologic structure to store natural gas. A necessary condition for this conversion is for the aquifer geologic structure to have the form of a dome. Simplistically, think of a bowl turned upside down. The top of the bowl is covered with an impermeable rock formation capable of preventing the upward migration of natural gas. Under this impermeable rock is a porous, water-filled rock. Natural gas is injected into the pore space of this rock displacing the water. The displaced water forms the seal on the bottom of the injected natural gas to contain it from below. The area storing the natural gas is referred to as the reservoir.

Q. What basis did IP provide for derating the peak day capacity of the Shanghai gas storage field?

A. According to the Company's response to Staff data request ENG 2.56, the reduction in the peak day capacity, or "derating", of the Shanghai storage field was associated with the field's recent performance actually realized by the Company. IP attributed several factors for the decline in the expected withdrawal capability at Shanghai. These were:

1996, p. 103.

1. The expected general decline in deliverability due to the age of the aquifer,

2. A metering error, on the inject side, was discovered in the Company's initial inquiry, and

3. Mechanical problems at some of the Shanghai wells.

Storage Field Deliverability Decline

Q. What information did IP provide to support its contention that as aquifer storage fields age their deliverability will decline?

A. IP's response to Staff data request ENG 2.112 provided information from various industry sources about aquifer storage fields. The first source, which was dated January 1998, referenced a 1995 study that noted downhole damage in wells could cause a deliverability decline of 3 to 5% a year in wells. Another document, which was dated December 1999, was a summary of a report on techniques used within the industry to perform remedial work on wells to provide improvements in the deliverability of the wells. The final piece of information was a copy of a page from a 1993 document entitled "Managing Water-Drive Gas Reservoirs." The marked section on that page noted that:

> Parallel hysteresis loops can be indicative of a decline in the productivity of withdrawal wells in aquifer gas storage reservoirs. The flow rate in a producing gas well is proportional to $\Delta p/\Delta x$ (available pressure gradient divided by the distance over which that pressure drop applies). If an aquifer gas storage reservoir is operated at approximately the same maximum and minimum pressures each year, Δp will remain the essentially constant but Δx will increase as the gas bubble grows. Thus, the observed flowrate will decrease with decreasing $\Delta p/\Delta x$.

Q. Do you agree with IP's reply?

A. No. I agree that downhole damage in wells can reduce the deliverability of an aquifer storage field. However, the other data that IP provided in its response are not necessarily related to the cause of the reduced deliverability. The summary of possible methods for remediation of wells is a source of possible strategies to correct downhole damage. The other item quoted above discusses parallel hysteresis loops that are more of a diagnostic tool to help identify a problem rather than basis for having a problem within an aquifer storage field.

Q. What are hysteresis loops?

A. A hysteresis curve is a plot or graph of the gas pressure in the storage field versus the field inventory. A hysteresis loop refers to resulting shape on the graph from plotting one year of data. Multiple years of data on the same graph provide multiple loops. The quote above referring to parallel hysteresis loops refers to the shifting of the loop over time.

Q. What purpose does a hysteresis curve serve?

A. A hysteresis curve can be used to track the performance of a storage field, which in turn provides a means to verify the inventory within the field. This information can also allow for interpretations of gas migration, seepage and bubble growth[2].

[2] Natural Gas Underground Storage: Inventory and Deliverability, M. Rasin Tek, Penwell Publishing, 1996, pp. 4-6.

In short, hysteresis curves allow entities to monitor their underground storage reservoir's performance.

Q. Does IP use hysteresis curves to monitor its aquifer storage fields?

A. No. Staff data request ENG 2.155 requested copies of all hysteresis graphs that IP had performed for the Hillsboro and Shanghai storage fields since 1995. IP's response stated that it had not performed hysteresis graphs for Hillsboro and Shanghai.

Q. Do you believe it is prudent for IP to not plot hysteresis graphs for its Hillsboro and Shanghai storage fields?

A. No. Hysteresis graphs are an industry standard for monitoring the performance of storage fields. Further, IP's response to Staff data request ENG 2.112, quoted above, noted that parallel hysteresis loops on a hysteresis graph could be indicative of a decline in the productivity of withdrawal wells in aquifer gas storage reservoirs. However, IP has not plotted the hysteresis graphs for its storage field in order to ascertain the productivity of its withdrawal wells or to possibly identify other problems within the fields. Had IP made use of this important diagnostic tool, it could have identified problems at the Shanghai storage field much sooner and without incurring the need to reduce the peak day deliverability of its storage field. Without a reduction in the peak day capacity at Shanghai, IP, and ultimately PGA customers, would not have incurred any additional replacement gas costs to replace the lost capacity.

Metering Error

Q. What metering error did IP encounter at the Shanghai storage field?

A. According to the Company's response to Staff data request ENG 2.109, IP identified metering errors at the Shanghai storage field on January 4, 2000. IP believes those errors existed since the Company upgraded the control system at Shanghai in 1995. Further, IP estimated, in its response to Staff data request ENG 2.110, that the metering error caused gas withdrawals to be undermetered by 7 to 8%. IP estimated the metering errors caused the actual inventory remaining in the field to be 743,313 Mcf less than book volume prior to the inventory correction.

Q. How much gas does the Shanghai storage field normally contain when filled?

A. According to the Company's response to Staff data request ENG 2.5, the Shanghai field contains 4,000,000 Mcf of natural gas. This inventory value likely refers to the amount of top gas that IP attempts to cycle within a year. Therefore, the metering error that IP estimated is about 18.5 percent of the amount IP normally attempts to cycle.

Q. How is natural gas within a storage field classified?

A. There are three classifications for natural gas within the storage reservoir: non-recoverable base gas, recoverable base gas, and top or working gas.

The non-recoverable base gas is natural gas trapped within the reservoir that cannot be recovered from the reservoir at abandonment.

The recoverable base gas is the natural gas that is not normally cycled but is in the reservoir to provide the pressure required to cycle the top or working gas. Recoverable base gas can be removed from the reservoir at abandonment.

The top or working gas is the gas that a utility would expect to withdraw from its storage field during the winter season and then replace the same amount of gas by injecting it back into the reservoir during the non-winter months of the year.

Q. How does IP verify its storage inventory at Shanghai?

A. According to the Company's response to Staff data request ENG 2.115, daily injection and withdrawal logs, neutron logs, and daily well records are all part of the inventory verification process.

Q. What are neutron logs?

A. Neutron logs measure 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. Did a review of the neutron logs at Shanghai indicate a loss of gas?

A. No. The Company's response to Staff data request ENG 2.169 noted that IP reviews neutron logs on an annual basis for the Shanghai storage field. Eight wells had neutron logs completed in November, 1999. IP noted those logs provided no indication of inventory problems at Shanghai.

Q. Did one of IP's other inventory verification methods identify the loss of gas?

A. No.

Q. How did IP become aware of the metering problem and subsequent loss of gas at Shanghai?

A. According to the Company's response to Staff data request ENG 2.168, IP became aware of the metering error as a result of its efforts to identify causes of lost deliverability at Shanghai. IP had its technical staff test the meters at Shanghai. As a result of those tests, IP noted a problem with the in-place gear sets.

Q. Do you agree with IP's explanation?

A. No. On June 11, 2002, I met with various IP personnel at the Company's dispatch center. One topic that was discussed at that time was how IP identified the metering problem at the Shanghai storage field. According to IP employee Wayne Hood, a problem was noticed at the Hillsboro storage field regarding its metering. IP's inquiry into that problem located an error with an orifice meter at

the Hillsboro storage field. After locating that error, IP checked the metering at Shanghai to see if a similar problem existed. When this check was made, the problem with the metering at Shanghai was found. However, the problem at Shanghai, according to the Company's response to Staff data request ENG 2.109, involved the K-factor used to correct for the physical meter reading and was not related to any error with the orifice meter found at IP's Hillsboro storage field.

Q. What is a K-factor?

A. A K-factor is the gear ratio used to convert the physical meter output into a device for providing an electronic signal to send flow data back to the Company. The meter itself was not in error, but there was an error in the constant that the Company assumed with the meter output.

Q. Were there other problems at Shanghai that may have indicated a gas loss?

A. Yes. During my June 11, 2002, meeting at IP's dispatch center I also met with Curt Kemppainen to discuss various topics related to the storage fields. During this discussion, the topic of Shanghai storage field's monitor wells came up including the fact that natural gas had not been observed within the monitor wells prior to the winter season of 1999-2000. At that same time, I also asked how many other occasions a similar event had occurred. That information was not available at that time.

Q. What are monitor wells?

A. Monitor wells are wells located at or near the edge of the gas bubble within a storage field and are used to verify that the gas bubble associated with the storage field has not moved or migrated away from the storage formation.

Q. Is the lack of observing natural gas within a monitor well significant?

A. Yes. According to the Company's response to Staff data request ENG 2.170, historically, natural gas was detected or observed within the monitor wells at the Shanghai storage field when the field was full prior to the winter withdrawal season. A change from observing natural gas to not observing natural gas within the monitor well is a major warning that something has changed within the storage field.

Q. How many years had IP noted that natural gas was not being observed within the monitor wells at Shanghai?

A. According to the Company's response to Staff data request ENG 2.170, there were no years in which natural gas was not detected within the observation wells at Shanghai. This response directly conflicts with the information that was discussed with me on June 11, 2002.

Q. When did IP replace the 743,313 Mcf of natural gas at Shanghai that was removed due to the metering error?

A. The Company's response to Staff data request ENG 2.166 provides a timeline of the actions taken by IP to identify the problem and restore the deliverability at Shanghai. This response notes the following:

January 4, 2000 - IP corrected the metering K-factors

January, 2000 – Sand production experienced in one well (per Company's response to Staff data request ENG 2.172)

Summer, 2000 - IP conducted normal injections into the field

Fall/Winter, 2000-2001 - IP continued to have deliverability concerns and experienced sand and water production problems

Spring, 2001 – Study conducted by Halliburton showed perforation damage in various wells

Summer/Fall, 2001 – Additional gas injected to compensate for metering error

October, 2001 – Well treatment at one Shanghai well

November, 2001 – Well treatment at two additional Shanghai wells

Q. What does the above indicate to you?

A. IP did not act prudently regarding the events leading up to the discovery of the metering error at the Shanghai storage field and IP's subsequent actions after the discovery were imprudent. IP's inventory verification process failed to identify the loss of gas due to the metering error. The Company also had opportunities to observe atypical events occurring at the storage field, but failed to observe or capitalize on them. Once the meter error was found, the Company delayed for more than one year to replace the majority of the gas lost due to the metering

error. The failure to timely observe the loss of gas and then the inexplicable delay in replacing the gas lost as a result of the metering error may have contributed to the subsequent deliverability problems with the Shanghai storage field, which, in turn, caused IP to incur replacement gas costs during the reconciliation period.

Mechanical Problems

Q. What mechanical problems has IP faced at the Shanghai storage field?

A. According to the Company's response to Staff data request ENG 2.107, the F-5-A well experienced sand production problems in late January 2000. Also, as noted in the Company's response to Staff data request ENG 2.108, a study done by Halliburton showed that well perforations at 6 wells had become plugged with scale.

Q. What is sand production in relation to a storage field well?

A. As natural gas is removed from storage during the winter season, the gas contains impurities, such as water and in some cases sand. Wells that have sand production problems pull a large amount of sand out with the gas during the withdrawal season. This sand can fill the bottom of the well bore or clog the well's perforations, which can limit that well's ability to withdraw natural gas. The sand also acts as an abrasive (similar to sand blasting) that can damage all equipment located within and downstream of that well.

Q. Had the Company previously experienced sand production problems at Shanghai?

A. According to the Company's response to Staff data request ENG 2.172, the first occurrence of sand production at Shanghai occurred in 2000 at the F-5-A well and that no other well has experienced a similar problem.

Q. What are well perforations?

A. Well perforations refer to the holes located within the well casing. These holes are made in the casing wall at the depth of the geologic formation being used to create the storage reservoir. These perforations are the means by which gas is physically injected and withdrawn from the storage reservoir.

Q. What has IP done to correct the mechanical problems at Shanghai?

A. According to the Company's response to Staff data request ENG 2.108, IP had Halliburton perform chemical treatment on three wells in 2001 and is evaluating the effects of these treatments for potential treatments of the other wells.

Q. Has IP ever encountered problems at Shanghai in the past?

A. Yes. Staff data request ENG 2.112 requested the Company explain what action it had taken prior to the event at question in the instant proceeding to maintain Shanghai's deliverability. The Company's response noted that several wells were reperforated in the past. The data provided by the Company indicated that

one well was reperforated in 1991, four in 1992, and two in 1994. IP also noted a casing repair was made in 1994.

Q. What does it mean to reperforate a well?

A. Reperforating a well is the process by which new holes or perforations are made within the well casing.

Q. What does the above indicate to you?

A. The above information tells me two things. First, due to the need to previously reperforate wells at Shanghai and information available about the industry in general, IP knew the potential existed for the well deliverability at Shanghai to decline over time. Second, the fact that Shanghai had never previously experienced a sanding problem, yet suddenly experiences this problem at the same time it was operating with reduced amount of natural gas within the reservoir suggests a linkage between the two events. As was noted above, IP did not act prudently to replace the gas lost due to the metering error in a timely fashion.

Corrective Action Taken

Q. What has IP done to return the Shanghai storage field's peak day capacity to prior levels?

A. According to the Company's response to Staff data request 2.56, the Company had Halliburton Energy Service perform well enhancement treatments on three

wells with additional well treatments planned for 2002. The Company also injected additional volumes of natural gas into the field to replace the gas removed as a result of the metering error.

Q. What are well enhancement treatments?

A. Well enhancement treatments refer to the process by which chemicals are injected into the well bore in order to essentially clean the well bore and perforations of any deposits. A storage field well, after treatment, should experience improved deliverability. Improvements in individual well deliverability also improve the overall deliverability of the storage field.

Conclusion

Q. What does all of the above information regarding the derating Shanghai indicate to you?

A. The above information tells me the Company should have identified and acted upon potential deliverability problems at the Shanghai storage field prior to encountering the need to reduce the peak day capacity of the field. My conclusion is based upon the following observations. First, IP knew that wells at aquifer storage fields experience deliverability declines. The information IP provided within its data request responses, which is discussed above, was dated from the mid to late 1990s. However, the industry's, and therefore IP's knowledge of the potential reduction in well deliverability is much older. That

conclusion is supported by the fact that in the early 1990s, IP reperforated several wells at Shanghai to maintain the field's deliverability.

Second, IP's response to a Staff data request noted the use of parallel hysteresis loops to identify deliverability declines within aquifer storage fields. Reference material that Staff possesses indicates a multitude of other uses for hysteresis curves. Essentially, the hysteresis curve is a very important diagnostic tool for a utility to use, but was not being used by the Company since at least 1995.

Third, assuming the information that I discussed with IP personnel on June 11, 2002 is accurate, IP used various methods to conduct inventory verification at the Shanghai storage field. However, the loss of 18.5% of the field's top gas went undiscovered until a problem was found at the Hillsboro storage field and IP checked to see if Shanghai had encountered a similar problem.

Fourth, assuming the information that I discussed with IP personnel on June 11, 2002 is accurate, IP did not capitalize upon or make use of the observation that gas was not being detected or observed within the monitor wells at Shanghai. This observation, at a minimum, should have had IP investigating potential problems at the storage field prior to its discovery of a metering error at the field.

Fifth, even though IP made the correction with the metering K-factor in January 2000, it waited until the Summer and Fall of 2001, more than a year later, to replace most of the gas inadvertently removed from the storage reservoir due to the metering error.

Sixth, the Company's failure to replace the gas lost due to the metering error in the Shanghai reservoir in a timely fashion may have contributed to one of Shanghai's wells developing a sand production problem, even though wells at the Shanghai storage field have never before experienced sand production problems.

Finally, the last occasion that IP took action to maintain the Shanghai storage field's deliverability was a casing repair and two well reperforations in 1994. This means there is a seven-year lag from the time IP last performed any significant work at the field. The 3-5% per year decline in well deliverability value due to downhole damage suggests the potential for a 21 to 35 percent reduction at some or all of the wells at Shanghai with downhole damage since IP last performed work to maintain the Shanghai gas storage field's deliverability.

Q. Are the above seven observations the entire basis for your finding the Company's decision to reduce Shanghai's peak day capacity imprudent?

A. No. My observations above form a portion of my basis for finding IP's decision to reduce the Shanghai storage field's deliverability imprudent. However, my review also uncovered several other concerns that cover all of IP's storage operations and also relate to my finding of imprudence regarding the reduction in peak day capacity at the Shanghai storage field.

Overall Storage Concerns

Q. Do you have additional concerns that specifically relate to the reduction in peak day capacity at the Shanghai storage field?

A. Yes. First, it is uncommon for a utility to reduce the peak day capacity of its storage fields, yet IP has reduced the peak day capacity of both of its largest storage fields, Shanghai as discussed above and its Hillsboro storage field in 1999. 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 and has kept its operations and maintenance expense constant for a considerable about of time. Finally, the Company's ability to properly identify the root cause of problems and therefore its ability to correct those problems is poor.

Reduction in Peak Day Capacity

Q. When did IP reduce the peak day capacity of its Hillsboro storage field?

A. The Hillsboro storage field was previously rated at 125,000 Mcf/day until reduced to 100,000 Mcf/day in 1999.

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 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.

Q. For how long was the Hillsboro field rated at a peak day capacity of 125,000 Mcf/day?

A. The field was rated at 125,000 Mcf/day since the winter season of 1993-1994. This increase incurred as a result of the Hillsboro expansion project that took place prior to the winter season of 1993-1994. In IP's last natural gas rate case, Docket No. 93-0183, the cost of the Hillsboro expansion project was added to rate base. This Order, dated April 6, 1994, notes on page 11, that the Commission found IP prudent for its initiation of the project and found the $54.7 million estimated cost for the project to be prudent and reasonable. Finally, on page 12 of this Order, the Commission found the project to be used and useful.

Q. Do you have any concerns about IP's decision to reduce the peak day deliverability of its Hillsboro storage field?

A. Yes, however, I do not make any finding of imprudence at this time. The circumstances that caused IP to reduce the deliverability of the Hillsboro storage field are somewhat different than those surrounding the Shanghai storage field's reduced deliverability. IP has performed studies and completed some capital projects at Hillsboro in an attempt to regain some of the lost deliverability. However, the items discussed below apply to all of IP's storage fields, therefore,

IP should practice due diligence in its attempts to regain the deliverability of its Hillsboro storage field in the future.

Manpower

Q. How have manpower levels been impacted at the Company's storage field operations?

A. According to the Company's response to Staff data request ENG 2.120, 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 persons from 1991 through November of 1995 to two at the end of 1995 and finally dropping to one at the beginning of 2000.

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 currently has reduced the peak day deliverability of its two largest storage field, which is causing IP to incur additional gas costs that it is attempting pass on to its customers. As I discussed above with the Shanghai events, IP could not identify the loss of gas due to the metering error in a timely fashion. As I will discuss below with regard to the Hillsboro incident, IP conducts poor root cause analyses. 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.

Capital Expenditures and Operation and Maintenance Expenses

Q. How has spending been impacted at the storage fields over historical levels?

A. According to the Company's responses to Staff data request ENG 2.121 from the instant proceeding and ENG 2.81 from Docket No. 00-0714, the operations and maintenance expense amounts have held fairly steady over the last 10 years. However, the capital expenditure budget, which the Company was only able to provide five years of actual data and six years of budgeted data, indicates a significant drop in the amount of money being allocated. In fact, the budgeted amount for 2002 is approximately one-third of the amount that IP budgeted for

1997 and 1998. The actual values are shown on ICC Staff Exhibit 2.00, Schedule 2.04.

Q. Why have the capital expenditure levels from 1997 and 1998 dropped so dramatically?

A. According to the Company's response to Staff data request ENG 2.171, the capital budgets in 1997 and 1998 were much larger due to budgeting of specific large items to upgrade the storage fields. In 1997, the Shanghai oxidizer and re-boiler were replaced at a budget of $2.1 million. In 1998, the budget included approximately $1.3 million for the upgrade of the Freeburg-Tilden control system.

Q. Earlier, you discussed that IP had Halliburton perform well treatments to improve the deliverability of the Shanghai storage field. What do these treatments cost?

A. According to information that I received while at IP on June 11, 2002, the cost to treat one well at Shanghai would cost about $115,000. However, I do not know if IP would account for this cost as a capital expenditure or an operation and maintenance expense, or portions of both.

Q. What is the annual cost associated with reducing the Shanghai storage field's peak day deliverability by 25,000 Mcf/day?

A. Using the information within ICC Staff Exhibit 2.00, Schedule 2.03, but changing the number of days to coincide with a full winter season, 151 days, the cost exceeds $900,000.

Q. Does the above information about capital expenditures and the cost for well treatments versus the cost for lost deliverability 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. However, 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 either maintaining below prudent levels or even reducing the amounts budgeted for capital expenditures or operation and maintenance expenses for 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 based upon the problems that IP has encountered at the Shanghai storage field as well as the Hillsboro storage field. The Shanghai incident is the Company's failure to identify the loss of gas from Shanghai, which is discussed above. The second event was when the Hillsboro storage field experienced 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.

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. 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 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 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, 10.9 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 Docket No. 00-0714. In fact, 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 this is the first time that the

Company realized 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 freezing rain that

occurred the night of the incident was not considered significant. There were no downed power lines or power outages resulting from the freezing rain.

The second scenario 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 also causes its ratepayers to incur additional costs.

Conclusion

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 Shanghai storage field during the reconciliation period. First, it is very uncommon for a utility to reduce the peak day capacity of a storage field, yet IP has 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 of its storage fields. 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 and kept its operations and maintenance expense fairly constant for a considerable amount of time. 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, unless deemed imprudently incurred, are automatically passed through to customers through the PGA.

Finally, the events surrounding the reduced peak day capacity of the Shanghai storage field and the Hillsboro incident discussed above indicates the poor oversight the Company maintains does not allow IP to properly identify and act upon the various problems facing its storage operations. IP's inability to operate its storage in a safe, reliable, and efficient manner also causes its ratepayers to incur additional costs.

Q. Does this conclude your direct testimony?

A. Yes.