STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

Illinois Commerce Commission	)	
On Its Own Motion	)	
	)	
vs.	)	
	)	**Docket No. 04-0677**
Illinois Power Company	)	
d/b/a AmerenIP	)	
	)	
Reconciliation of revenues collected under	)	
gas adjustment charges with actual costs	)	
prudently incurred.	)	

INIITIAL BRIEF OF
ILLINOIS POWER COMPANY
d/b/a AMERENIP

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I. Introduction and Summary

This case is the annual reconciliation of revenues collected under the gas adjustment charge with costs of gas prudently incurred for Illinois Power Company d/b/a AmerenIP ("AmerenIP", "IP" or "Company") for the year 2004, pursuant to 220 ILCS 5/9-220(a). Staff proposed one gas cost disallowance, relating to AmerenIP's management of its Hillsboro Storage Field ("Hillsboro", "HSF" or the "Field"). However, the record shows that based on the standard for prudence adopted by this Commission and the courts (*see* §II below), Staff's proposed adjustment is unwarranted and should be rejected.

Prior to 2004, Hillsboro experienced deliverability problems which were caused by (it was determined in 2003) an over-registration of injections on the main injection meters at the Field. Over a period of several years, less gas was injected into inventory than shown by the Company's metering records; as a result, the Company's withdrawals from storage had depleted the gas in storage. The Staff witness contended that AmerenIP should have discovered the source of the problem in 2000 and should have begun to reinject gas inventory into Hillsboro during the 2000 injection season to begin restoring the Field's depleted gas inventory. Had AmerenIP commenced reinjecting gas into HSF in 2000, it would have had more working gas inventory available for supply to customers during the winter months of 2004. Staff contended that as a result, AmerenIP's recoverable gas costs for 2004 should be reduced by $2,979,849. (Staff Ex. 2.00, Sch. 2.01.) He also presented an alternative disallowance calculation of $2,335,442, which would be applicable should the Commission conclude that AmerenIP should have commenced reinjecting gas into HSF during the 2001 injection season.[1] (*Id*., Sch. 2.02.)

[1]Although AmerenIP believes the record shows its actions were prudent in all respects, it also presented a calculation of the incremental gas costs incurred in 2004 if the Commission were to

As shown in §III below, AmerenIP acted prudently in all respects in its investigation, management and resolution of the Hillsboro deliverability decline. As described in §III.B, AmerenIP prudently and aggressively pursued the causes of the decline in gas deliverability from Hillsboro that began to occur after the capacity of the storage reservoir was approximately doubled in 1993. The Company applied significant attention and substantial internal and external resources to investigation of the problem and identification of its causes. Based on the fact that the deliverability issues arose after the storage reservoir was expanded, AmerenIP prudently focused on possible reservoir or structural causes, including the possibility of an unidentified sub-structure to which gas was migrating, losses of gas through leaks or fractures in the reservoir structure or the caprock, unusual dispersion of injected gas rendering it inaccessible, and underground impediments in the area of withdrawal wells that limited the ability to access and withdraw gas. AmerenIP also acted prudently and reasonably in refraining from beginning substantial reinjections of gas inventory while it was still investigating possible structural causes, since until these possible causes were fully investigated and eliminated (or confirmed), reinjected gas could have been lost as well.

It was ultimately determined, however, that the cause of the HSF deliverability decline was over-registration of gas injections by the main plant injection meters, so that for several years the meters recorded more gas being injected than was actually the case. AmerenIP discovered and remediated the metering problem in 1999, but underestimated the cumulative amount of the over-registration. In early 2003, as the result of its investigations and analyses, AmerenIP eliminated remaining possible structural causes for the Hillsboro deliverability

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conclude that the Company should have begun reinjecting significant quantities of replacement gas inventory in 2002. That amount is $1,187,804. (Ameren IP Ex. 2.3.)

decline, and determined the true extent of the injection meter over-registration. The Company then commenced reinjecting gas inventory in 2003.

As discussed in §III.C below, Staff contended that AmerenIP should have recognized the true extent of the injection meter over-registration, and started reinjecting significant amounts of replacement inventory, in 2000, even while it continued to investigate possible structural causes for the deliverability decline. Staff argued that AmerenIP had three "opportunities" to detect that the injection meter over-registration was much larger than originally believed, but failed to do so. However, each of Staff's three arguments was made with the benefit of hindsight, fails to take into account all of (and only) the information and circumstances confronting AmerenIP at the time, and does not demonstrate any imprudence.

First, Staff contended that AmerenIP should have used a methodology in 1999-2000 that it in fact employed in 2003 – using temperature and pressure data recorded at the individual injection/withdrawal ("I/W") wells at Hillsboro – to estimate the cumulative impact of the over-registration by the main plant injection meters. However, as discussed in §III.C.1, the I/W well data was not historically or normally used for this purpose. The meters at these wells are not used to record injection volumes and the meters were not even installed to American Gas Association ("AGA") standards for meters recording usage. Further, the I/W well data from prior years that the Company had maintained was incomplete and very limited. In Docket 04-0476, AmerenIP's 2004-2005 gas rate case, the same Staff witness heavily criticized IP's use of the I/W well data as insufficiently complete or reliable to use to estimate the amount of the HSF inventory depletion, and the Commission agreed with Staff's criticisms. There is no basis to conclude in this case that in 2000, reasonable management should have hit upon using the I/W well data to determine the amount of the injection meter over-registration, or that AmerenIP was

imprudent for not doing so in 2000. Further, the estimate of the cumulative injection meter over-registration that AmerenIP made in 1999, although determined to be an under-estimate, was reasonable at the time based on the information available.

Second, Staff contended that AmerenIP failed to place a sufficiently high priority on accurate measurements for *withdrawals* from the Hillsboro Field after its expansion, resulting in the failure to find a problem in one of the four plant *withdrawal* meters that resulted in an overstatement of *withdrawals* from the Field. However, as discussed in §III.C.2, the essence of Staff's argument is that AmerenIP should have followed maintenance and inspection practices for the HSF withdrawal meters embodied in a Commission regulation and AGA documents that by their terms are *not applicable* to non-custody-transfer storage field meters that are not used for customer billing. AmerenIP had maintenance and inspection practices for these meters that were reasonable and adequate for the use to which the meters were put. Further, the HSF deliverability decline was not due to the *withdrawal* meter error; and even if AmerenIP had discovered the problem with the *withdrawal* meter sooner, this would not have changed its original underestimation of the main plant *injection* meter over-registration, which ultimately proved to be the cause of the deliverability decline.

Third, Staff contended that AmerenIP failed to recognize the significance of the fact that in the 1999-2000 and 2000-2001 winters, it withdrew less gas from Hillsboro than was withdrawn prior to the 1993 expansion. Staff asserted this should have caused AmerenIP to realize that Hillsboro had an "inventory problem". However, as shown in §III.C.3, Staff misconstrued the significance of this information. Although AmerenIP was unable in those years to *withdraw* as much gas as it had prior to the expansion, this did not tell the Company what *volume* of gas inventory was in the Field, or whether injected gas was migrating to inaccessible

areas. Based on the information available to AmerenIP at the time and the potential causes of the deliverability decline it was investigating, it was quite possible that the Field contained sufficient *volume* of gas inventory, but that this gas could not be *accessed and withdrawn* due to structural problems such as leakage or migration from the main underground reservoir, or obstructions in the vicinity of withdrawal wells.

Further, and perhaps more significantly, each of Staff's arguments about missed "opportunities" that should have led AmerenIP to begin reinjecting significant amounts of replacement gas inventory in 2000 was misplaced because at that time AmerenIP was continuing to investigate, and had not eliminated the possibility of, plausible reservoir or structural causes for the HSF deliverability decline. As discussed in §III.C.4, even had AmerenIP recognized the significance of the three "opportunities" Staff cited, it would have been *imprudent* for AmerenIP to begin reinjecting significant amounts of replacement inventory into the HSF until it had investigated and eliminated (or confirmed) the plausible structural and reservoir causes of the deliverability decline. Based on the information available to AmerenIP in 2000, these potential reservoir or structural issues could have resulted in the reinjected gas inventory also becoming inaccessible and lost. Thus, Staff's arguments are not based on proper application of the prudence standard, in that Staff failed to take into account all of (and only) the information and circumstances facing the Company at the time of the alleged imprudence.

As an alternative, Staff contended that even if was reasonable for AmerenIP not to begin significant reinjections in 2000, it should have done so in 2001 after it drilled a new well at the location where a substructure to which gas was migrating was believed to exist, but failed to locate the substructure. This argument, however, also misapplied the prudence standard, because in 2001 and 2002 AmerenIP was continuing to investigate other plausible reservoir or structural

problems that could have been causing the deliverability decline. It was not until 2003 that AmerenIP was able, as a result of its investigations, to rule out the plausible reservoir or structural causes and therefore commence significant reinjections of replacement inventory, without risking that the reinjected gas would be lost.

In addition to Staff's three HSF-specific arguments, the Staff witness also raised several "overall storage concerns." These "overall storage concerns" included the reduction in peak day capacity at another storage field for the 2001-2002 winter, an event with respect to which the Commission, in AmerenIP's 2001 reconciliation case (Docket 01-0701) rejected Staff's recommendation for an imprudence disallowance (see §III.D.1); a reduction in the number of supervisors at AmerenIP's storage fields (see §III.D.2); a reduced level of storage field capital expenditures in certain years (see §III.D.3); and a purported inability (based on two examples) to conduct adequate root cause analysis and identify problems with its storage fields (see §III.D.4). However, as shown in §III.D, each of these "overall storage concerns" is unfounded. Perhaps more significantly, there is no causal connection between the "overall storage concerns" and the HSF deliverability decline or the speed and aggressiveness with which AmerenIP investigated, identified and remediated it. To the contrary, AmerenIP devoted significant resources to the investigation and remediation of the HSF deliverability decline, and was not constrained in its efforts by any lack of manpower or capital.

In summary, the Commission should reject Staff's position that AmerenIP acted imprudently in its management of the Hillsboro Storage Field and, in particular, in the investigation, determination and remediation of the HSF deliverability decline; and should reject Staff's recommendation for a gas cost disallowance. The Commission should adopt AmerenIP's proposed reconciliation statement presented on AmerenIP Exhibit 1.1.

II. Application of the Standard for Prudence

This Commission has adopted the following well-recognized standard for determining the prudence of a utility's management decisions and actions:

> Prudence is 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.
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> 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 the one or the other necessarily being "imprudent." (*Illinois Commerce Commission v. Commonwealth Edison Co.*, Docket 84-0395 (Oct. 7, 1987), p. 17.)

This standard has been confirmed by the Illinois courts. See, e.g., *Illinois Power Co. v. Commerce Commission*, 245 Ill. App. 3d 367, 371 (3d Dist. 1993) (reversing a Commission finding of imprudence); *Illinois Power Co. v. Commerce Commission*, 339 Ill. App. 3d 425, 428, 435 (5th Dist. 2003) (reversing a Commission finding of imprudence). The Commission has also recognized, in applying the prudence standard, that when human activity is involved, some errors are to be expected. (Order in Docket 84-0395, p. 19.) See also *Business & Professional People for the Public Interest v. Commerce Commission*, 279 Ill. App. 3d 824, 833 (1st Dist 1996) ("a small amount of human error is an unavoidable cost of any human endeavor").

As the Commission stated in its Order in Docket 01-0701, AmerenIP's PGA reconciliation case for 2001, in applying the prudence standard to evaluate Staff's proposal for an imprudence disallowance based on the Company's operation of its Shanghai Storage Field:

> As indicated above, the Commission has previously defined prudence as the 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. (Order in Docket 01-0701, p. 22)

> . . . This is not to say, however, that the circumstances identified by Staff and listed in [IP's] Shanghai Report could not have been perceived by some at the time of their occurrence as warnings of potential problems in the future. The question, though, is whether in light of *all* of the circumstances at Shanghai, was IP imprudent in its failure to realize that Shanghai's deliverability may be impaired in the future. (*Id*., p. 23; emphasis in original)
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> . . . [T]he Commission is persuaded by IP that IP acted reasonably and prudently with regard to its decision to reduce the peak day deliverability of Shanghai by 25,000 Mcf/d for purposes of its 2001 PGA reconciliation. While certain errors occurred and hindsight shows that some of IP's observations and beliefs were incorrect, a natural gas aquifer storage field is a complex physical system and the Commission finds that under the circumstances IP's actions with respect to Shanghai were not imprudent. (*Id*., p. 25)

The record in this case shows that under the foregoing standards, AmerenIP's management decisions and actions concerning the HSF deliverability decline, in the areas questioned by Staff, were prudent, based on the information known and available to AmerenIP at the relevant times and considering all of the circumstances faced by management at those times. Staff's recommended imprudence disallowances are based on its hindsight review of all of the relevant events from a perspective not available to management at the time decisions had to be made and actions taken. Further, in contending that AmerenIP acted imprudently in 2000 and 2001, the Staff witness sought to substitute his judgment as to the actions that should have been taken in 2000 and 2001 -- a judgment formed with the benefit of hindsight and complete retrospective information – for the judgment of AmerenIP's management that had to be exercised in 2000-2001 based on the information then available and in light of the circumstances confronting management at that time. Staff's recommendations boil down to a difference in judgment and opinion, which, as this Commission and the courts have recognized, does not constitute a basis for a finding of imprudence.

As AmerenIP witness Scott Glaeser, Vice President, Gas Supply and System Control for Ameren Energy Fuels and Services Company, explained:

> Staff witness Lounsberry's opinion that IP was imprudent in the actions it took to investigate the decline in deliverability of its Hillsboro Storage Field . . . are based on hindsight and do not adequately take into account the circumstances faced by IP at the time the decisions and actions at issue were being made. His recommendations are based on an after-the-fact analysis of what he thinks IP should have done or should have known based on certain information (to the exclusion of other information that IP had to take into account) at particular points in time. Mr. Lounsberry also greatly oversimplifies the difficulties associated with evaluating the multiple potential causes of the Hillsboro deliverability problems and eliminating potential causes to arrive at the actual cause or combination of causes. His analysis fails to adequately take into account that underground storage reservoirs such as Hillsboro are complex geological systems whose characteristics cannot be known with complete certainty. (AmerenIP Ex. 4.0 Rev., pp. 4-5.)

Additionally, Staff's recommendations take "prudence" to a point that introduces a level of risk to the gas distribution business that is inconsistent with the level of return AmerenIP is allowed to earn from this regulated business. (*Id.*, p. 5.) AmerenIP, of course, earns no return on its sales of gas to its customers. It is allowed to earn a return only on its investment in gas delivery facilities, at a rate which reflects the supposedly low level of risk of this regulated business. Further, AmerenIP cannot recover more than its actual cost of gas incurred for supply to customers, but it is subject to imprudence disallowances that reduce its recovery of actually incurred costs. As Mr. Glaeser testified:

> [I]n 2004 IP had total purchased gas costs of over $336 million, which is equal to about 70% of IP's total gas utility operating revenues. Illinois Power earns no return on the sale of this gas to customers and earns no return for acquiring this gas for its customers. IP's return on its gas utility business is earned only from the allowed rate of return applied to its assets included in rate base. In 2004, Illinois Power had net gas utility income of approximately $29.1 million, which represented only about a 6.1% margin on its gas operating revenues. Mr. Lounsberry's proposed imprudence disallowance of more than $2.9 million in this case represents about 10% of IP's total gas operating income. Thus, Mr. Lounsberry's proposed disallowance imposes a very substantial risk of loss on IP's relatively modest rewards from the gas utility business. (*Id.*, pp. 5-6.)

Mr. Glaeser explained that from a policy perspective the Commission should have grave concerns about the message being sent to Illinois gas utilities if Staff's proposed disallowance in

this case (and in AmerenIP's 2003 PGA reconciliation case) were approved. Other gas utilities would look at the Company and Staff testimony in this case and conclude that AmerenIP prudently managed the Hillsboro Field but the Commission still ordered a disallowance. They would then logically look at their own operations and question the risk they have in the continued operations of their storage facilities. Further, they would also have to factor in this additional risk if they were contemplating further expansion or initial development of additional storage capacity. (*Id*., p. 6.) As Mr. Glaeser stated:

> Ameren does not believe . . . and I do not think other utilities would believe, that substantial cost disallowances should be imposed on the grounds that, for example, the utility failed to follow regulations or standards that by their terms are not applicable to the operations under review (as Mr. Lounsberry recommends in this case); or that substantial disallowances should be imposed on the grounds that the utility did not inject substantial quantities of gas into an underground reservoir structure while uncertainties still existed as to the structural integrity of that reservoir, and the possibility existed that the gas could migrate to inaccessible areas (as Mr. Lounsberry proposes in this case). Ameren does not believe, and I do not think other utilities would believe, that such outcomes are consistent with the "regulatory compact." For these reasons, I disagree with Mr. Lounsberry's statement . . . that other utilities would look at the facts of this case and not conclude that IP acted prudently. I continue to believe other utilities that looked at the record in this case (and in my view the Commission should take into account their perceptions) would conclude that IP prudently managed the Hillsboro Storage Field under the established standard of prudence; and that they would perceive increased risk to their own operations from the manner in which the prudence concept has been applied by Staff in these cases. (AmerenIP Ex. 4.1, pp. 6-7.)

At a time when expansion and enhancement of storage capacity should be encouraged to help mitigate the impacts of gas price volatility and price spikes to consumers, the imposition of a disallowance based on the evidence in this case would create an atmosphere of uncertainty and

additional risk that would discourage further development of gas storage facilities in Illinois.[2] (AmerenIP Ex. 4.0 Rev., p. 7; AmerenIP Ex. 4.1, pp. 9-10.) As Mr. Glaeser explained:

> While the development or expansion of a storage field should reduce gas supply-related costs to customers through the potential reduction of commodity gas costs and the reduction of reserved pipeline capacity costs, the utility receives no benefit from these cost reductions, since the benefits are all passed directly to customers through the PGA. Thus, from the shareholders' perspective, there are no economies to be achieved from investing in additional storage assets in terms of increasing profitability by investing capital to reduce operating costs. The economic benefit that a utility receives from making additional investments in storage assets is the rate of return on investment that it will earn from placing the assets in rate base. Further, even within the scope of its own electric and gas operations, a utility such as Ameren has a wide variety of assets into which it can invest new capital . . . All other things equal, a utility will tend to invest its capital in those areas of its operations in which it believes it has a better chance of earning its cost of capital. If the utility sees a probability of gas cost disallowances being imposed due to its operation of a new or expanded storage field, the utility will have to factor in the risk of disallowances in analyzing its expected return on an investment in new or expanded storage field assets. This will make investment in new storage assets relatively less attractive.
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> Finally, storage fields, by their very nature, require the utilization of natural geologic formations on which only imperfect information is available and which may not perform exactly as planned and engineered. Mr. Lounsberry's recommendations in this case will create an environment of concern that a storage asset that does not perform perfectly may trigger a regulatory disallowance. This will dampen enthusiasm for storage field investments versus other more controllable investments such as power plants or transmission pipelines which can be fully designed, engineered, and manufactured for a defined performance parameter.
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> . . . If the utility sees an increased probability in the future of the regulator imposing gas cost disallowances based on the operation of the storage field, the utility will have to factor that possibility into its evaluation of the expected return to be earned from investments in a new storage field or expansion of an existing field. (AmerenIP Ex. 4.1, pp. 8-10.)

If the risk increases that the return a utility can earn on its investment in expanding a storage field or developing a new field may be wiped out by an imprudence disallowance, that

[2]Significant opportunities remain in Illinois for expansion and increased utilization of existing storage facilities or development of new storage facilities, such as former gas production fields that have become depleted. (AmerenIP Ex. 4.1, pp. 7-8.)

increased risk will be factored into the utility's economic analysis of whether to invest in new or expanded storage facilities. In the long term this would be a bad outcome for gas customers because it may discourage the utility from making investments to develop storage. (*Id*., pp. 8-9.)

Finally, in evaluating AmerenIP's actions in investigating and remediating the Hillsboro deliverability decline, the Commission should keep two important considerations in mind. First, as the Commission stated in its Order in Docket 01-0701 (p. 25), "a natural gas aquifer storage field is a complex physical system." The actual characteristics of the underground reservoir and the manner in which the injected gas is dispersed into the aquifer cannot be observed directly but must be inferred from secondary information such as seismic analysis, hydrogen ion concentrations and well pressures. Second, industry experience shows that declines in deliverability are the most commonly-experienced problem in the gas storage industry. The most frequent causes of these deliverability declines are physical or structural problems. (AmerenIP Ex. 5.0, p. 19.) Thus, in investigating the cause of the Hillsboro deliverability decline, it was logical and appropriate for AmerenIP to focus its attention on possible structural or geologic causes, in light of both overall industry experience and the specific factors at Hillsboro including the recent significant expansion of the Field.

III. Staff's Proposed Disallowances Relating to the Operation of the Hillsboro Storage Field Should Be Rejected

A. Overview

Staff recommended that AmerenIP should be found imprudent for being unable to withdraw the full seasonal quantity of working gas inventory (7.6 Bcf) from Hillsboro during the 2004 reconciliation period. (Staff Ex. 4.00, p. 2.) Staff contended that AmerenIP missed several opportunities to discover the cause of the HSF deliverability decline, and should have identified the cause of the deliverability decline, and begun reinjecting gas inventory, sooner than it did.

(Staff Ex. 2.00, p. 1; Staff Ex. 4.00, pp. 2-3; Tr. 51.) Specifically, Staff contended that AmerenIP should have begun reinjecting replacement gas inventory into Hillsboro during the 2000 injection season (rather than during 2003, when AmerenIP in fact began to restore the depleted HSF gas inventory). (Staff Ex. 2.00, p. 20.)

The Staff witness also based his disallowance recommendation on "IP's actions regarding its storage operations overall." (Staff Ex. 4.00, p. 2.) Specifically, he cited "reduction in management oversight", "reduction in capital spending" and "inability to identify problems or to conduct thorough root cause analyses." (*Id*., p. 3.) He asserted that all of these areas contributed to the reduction of the seasonal withdrawal capability of Hillsboro. (*Id*.)

Staff's disallowance recommendation should be rejected. The record demonstrates that AmerenIP acted prudently and reasonably in its investigation, identification and remediation of the Hillsboro deliverability decline. The Staff witness's characterizations of certain of AmerenIP's actions as imprudent were made with the benefit of hindsight and constitute differences of opinion and second-guessing. They fail to take into account all the circumstances faced by management at the points in time that Staff contends AmerenIP should have taken different actions. In fact, contrary to Staff's contentions, the record demonstrates it would have been *imprudent* for AmerenIP to begin reinjecting significant quantities of replacement gas inventory into HSF in 2000 or 2001. Further, the record shows that each of the Staff witness's "overall storage concerns" is unfounded. Moreover, the record does not indicate any causal connection between any of the "overall storage concerns" and either the Hillsboro deliverability decline or the speed with which the Company investigated, identified and remedied it.

Section III.B below recounts the history of AmerenIP's investigation, determination and remediation of the cause of the Hillsboro deliverability decline. Section III.C demonstrates that

Staff's specific claims of imprudence in AmerenIP's investigation of the HSF deliverability decline are unfounded. Section III.D shows that the Staff witness's "overall storage concerns" are unfounded, unrelated to the investigation and remediation of the HSF delivery issues, and provide no basis for a finding of imprudence or imposition of a disallowance.

B. AmerenIP Prudently and Aggressively Investigated the Cause of the Hillsboro Deliverability Decline

The history of AmerenIP's investigation, determination and remediation of the causes of the HSF deliverability decline were described by AmerenIP witnesses Wayne Hood and Curtis Kemppainen, both Consulting Engineers in AmerenIP's Gas Operations Support Group, and Timothy Hower, President of MHA Petroleum Consultants, a geology and engineering consulting firm. Mr. Hood has been employed by AmerenIP or predecessors since 1977 and has been in positions directly supporting AmerenIP's gas storage fields since 1984. Mr. Kemppainen has 36 years of experience in the gas and oil industries and has been employed by AmerenIP since 1992 in gas storage and transmission operations. (AmerenIP Ex. 3.0, pp. 1-2.) Mr. Hower holds undergraduate and graduate degrees in Petroleum and Natural Gas Engineering, is a registered professional engineer, and has 24 years of experience working in the oil and gas industry, with much of that experience in the area of underground storage. Specifically, he has been involved in the design, analysis and implementation of gas storage reservoirs for 15 years. (AmerenIP Ex. 5.0, pp. 1-2.) These witnesses have both extensive industry experience and personal experience and knowledge concerning AmerenIP's investigation, identification and remediation of the Hillsboro deliverability decline.

1. Expansion of the Hillsboro Storage Field

AmerenIP has had a storage field at Hillsboro since 1973; however, the Field was substantially upgraded in the early 1990s. As a result of the upgrade, which was completed in

1993, the base gas and working gas volumes in the Field were approximately doubled. (AmerenIP Ex. 3.0, p. 3.) Before the expansion, the Hillsboro Field had five I/W wells. In the expansion, nine additional I/W wells were drilled.[3] Additionally, AmerenIP increased the number of compressors at HSF from one to three units, increased the number of dehydration systems from one to three, relocated two regulator runs from below ground to above ground and added a third regulator run, installed redundant programmable logic controllers and input/output devices to monitor and control the plant, and installed other new or additional above-ground plant equipment. In expanding the above-ground equipment, AmerenIP replicated existing facilities that had performed satisfactorily for many years. (*Id*., pp. 4-5.)

2. Identification of a Deliverability Problem at Hillsboro

Initially, the expanded Field performed as expected. In each of the 1993-1994 through 1996-1997 winters, Hillsboro tested at a peak day deliverability value of 125,000 Mcf/day or greater; and for the 1993-1994 winter, approximately 7.6 Bcf of working gas was cycled. (AmerenIP Ex. 3.0, p. 5.) In subsequent winters, however, the amounts of gas that could be withdrawn declined, to 4.1 Bcf in 1998-1999. (*Id*.) Based on several years of declining deliverability, AmerenIP first became concerned that there could be a potential problem with HSF following the 1995-1996 winter.[4] (*Id*., p. 6.)

[3]The additional I/W wells were placed at various points throughout the Field, generally farther from the crest of the underground reservoir than the original I/W wells, to enable AmerenIP to inject and withdraw the working gas inventory from the reservoir formation as its structure was understood at the time. (AmerenIP Ex. 3.0, pp. 3-4, 7.)

[4]A low withdrawal volume in a single inject-withdraw cycle would not necessarily indicate a problem, because exogenous factors such as weather and other load constraints could impact the volume of gas cycled in a given year. Observation of reduced deliverability over several years would be necessary to indicate that there could be a physical or operating problem reducing deliverability. (*Id*., p. 6.)

3. AmerenIP's Investigation of Potential Structural Causes for the Hillsboro Deliverability Decline

AmerenIP initially focused its investigation on whether there was a reservoir or structural problem with Hillsboro, that is, whether either (i) gas injected into the Field was migrating from the underground reservoir as the Company understood its structure, or (ii) the shape of the underground structure was different than what had been expected. The result in either case would be that gas injected into the Field was moving or being pushed to areas where it could not be reached by the withdrawal wells. (AmerenIP Ex. 3.0, p. 7.) Investigating whether a reservoir problem was the source of the declining deliverability was the most logical avenue on which to focus investigation, because the Field had been significantly expanded in 1993 and deliverability began to decline in the second winter after the expansion from what had been expected. Based on the actions that had been taken to expand the storage reservoir, the possibility existed that the reservoir was physically breached during the expansion process, thereby allowing portions of the newly-injected, expanded gas inventory to escape from the reservoir. (*Id*., pp. 7-8.) A related possibility was that one of the new I/W wells was drilled near an undetected fault, with the result that a portion of the gas injected into that well could migrate off structure. (*Id*., p. 8.) Yet another possibility was that the shape of the underground reservoir was not what it was believed to be, or that unknown substructures existed; in either case, some of the additional gas injected into HSF in the expansion could be migrating to areas from which the gas could not be accessed by the withdrawal wells. (*Id*.)

In contrast, AmerenIP did not at the outset concentrate its investigation on any potential problems with above-ground equipment. In expanding HSF the Company had replicated and expanded existing above-ground facilities that had worked well prior to the expansion; therefore,

it was not thought likely that a problem with above-ground facilities was the source of the deliverability decline. (*Id*., p. 8.)

Because there was a wide range of specific potential causes for the deliverability decline, each of which could have warranted a unique set of corrective actions, it was appropriate for AmerenIP to take a cautious approach to identifying the actual cause of the problem. Further, it was appropriate for AmerenIP to focus initially on a potential reservoir or structural problem as the most likely cause. The potential causes included gas migration out of the storage reservoir, gas leaks to the surface or to geologic strata above the storage formation, or damage to the I/W wells that would have inhibited withdrawal of gas inventory. (AmerenIP Ex. 5.0, pp. 6-7.) Increased gas volumes in a storage reservoir (such as were injected into HSF in the 1993 expansion) can often lead to gas migration out of the field across structural spill points; alternatively, it can create breaches in the caprock that otherwise forms a seal to hold the stored gas in place. (*Id*., p. 7.)

To investigate potential reservoir problems as a cause of the Hillsboro deliverability decline, in 1997 AmerenIP had a vertical seismic profile ("VSP") of the Field prepared to evaluate if conducting a three-dimensional ("3-D") seismic profile of the Field would be a viable approach to defining its structure. The conclusion of the VSP study, which was completed in 1998, was that a 3-D seismic profile would be a viable approach. AmerenIP therefore proceeded with a 3-D seismic analysis.[5] (AmerenIP Ex. 3.0, p. 8.) The preliminary results of the 3-D

[5]A 3-D seismic profile is developed by measuring the travel times of sound waves propagated through the sub-surface; the signals reflect off the underground rock formations and bounce back to the surface where they are recorded. The reservoir structure is thereby identified in a 3-D image because the travel time of the reflected signal from structurally higher locations is shorter than in areas where the reservoir is deeper or farther below the surface. This process is conducted across the entire reservoir area, and the resultant recorded data is processed to yield a 3-D image of the reservoir. (AmerenIP Ex. 3.0, p. 9.)

seismic study indicated that approximately 3.5 Bcf of gas had migrated to another underground structure located to the northeast of the Field. (*Id.*, p. 9.)

Based on the results of the 3-D seismic study, in November 2000 AmerenIP drilled a new well, the Furness well, to the northeast of the Field to confirm or reject the existence of this substructure and to access the gas believed to be migrating to it. (AmerenIP Ex. 3.0, p. 13; AmerenIP Ex. 5.0, pp. 7-8.) When the new well was drilled, however, a substructure was not found. This result was not consistent with the results of the 3-D seismic analysis. AmerenIP therefore asked its consultant to review and re-evaluate the original results of the 3-D seismic survey. (AmerenIP Ex. 3.0, p. 14.)

Although drilling the Furness well did not locate a separate underground structure in the area indicated by the 3-D seismic analysis, this outcome did not invalidate the theory that the most likely cause of the HSF deliverability decline was that the structure of the underground reservoir was different than what the Company had understood it to be. (AmerenIP Ex. 5.0, pp. 15-17) It remained a distinct possibility that the general interpretation of the underground structure developed using the 3-D seismic data, namely, that gas was migrating away from the main reservoir, was correct, but that the gas was not migrating to a separate structure specifically in the vicinity where the Furness well was drilled. (*Id.*, p. 16.) Based on the information AmerenIP had from the analyses it had completed as of 2001, including drilling the Furness well, there were still a number of structural or geologic causes that could have been the source of the Hillsboro deliverability decline, including the following:

- Gas losses into the caprock – in an underground reservoir, the caprock is assumed to form an impermeable seal on the top of the reservoir. In some cases, however, the caprock can be semi-permeable, so gas can migrate out of the storage reservoir into the overlying formation where it is no longer accessible. (*Id.*, p. 9.)

- Unfavorable or irregular growth of the gas bubble due to adverse gas-water mobility in the reservoir – although gas injected into an aquifer like Hillsboro typically displaces the water in a piston-like manner, the injected gas can sometimes advance as thin channels or "fingers". This results in a very irregularly shaped gas bubble where, in some locations, gas migrates beyond the area of the field developed for storage. Gas that has migrated out of the developed area of the field becomes trapped and is not available as part of the active working gas volume. (*Id.*)

- Gas losses across a fault or fracture in the reservoir -- It is common in the gas storage industry that undetected faults or fractures (breaks or cracks in the reservoir rock) are found within storage reservoirs. Such faults or fractures can be conduits or pathways for gas to migrate out of the storage formation, causing it to be lost from the storage formation and no longer available as part of the working gas volume. (*Id.*, pp. 9-10.)

To assist in further analysis of the 3-D seismic data, in June 2001 AmerenIP had a crosswell seismic survey performed between the Furness and Snyder No. 2 wells and the Roth Boyle No. 1 and Snyder No. 2 wells.[6] The information obtained from this study was used to reprocess the 3-D seismic study data. (AmerenIP Ex. 3.0, p. 14.) Based on the results from drilling the Furness well and the reprocessed 3-D seismic data, it was concluded in the Fall of 2001 that the additional structure that had been thought to exist to the northeast of the Hillsboro underground structure did not exist. (*Id.*)

4. Peterson Metering Study

While investigating the possible reservoir or structural causes for the Hillsboro deliverability decline, AmerenIP also retained Peterson Engineering to conduct an audit of the metering at the Hillsboro Field. Peterson issued its report in December 1999, identifying two problems with the metering. (AmerenIP Ex. 3.0, pp. 9-10.)

(1) It was determined that two new injection meters that had been installed at the Field were over-registering gas volumes under certain operating conditions. The

[6]A crosswell seismic survey is a high resolution process capable of resolving features much smaller than those visible with 3-D surface seismic analysis. (AmerenIP Ex. 3.0, p. 14.)

plant compressors, when operating at certain loading steps, caused these meters to over-spin thereby recording greater injection volumes than were in fact passing through the meters. Peterson calculated the over-registration to be 26% when the compressors were operating at 50% loadings but only about 1.7% when the compressors were operating at 100% loadings. (*Id*., p. 10.)

(2) The audit found that the actual size of the orifice plate opening on the meter on the south secondary withdrawal run at HSF was smaller than the size value stamped on the orifice plate by the manufacturer.[7] The orifice size stamped on the equipment was the size AmerenIP had ordered, but was larger than the actual size of the opening, by 10% (5.5 inches versus 5.0 inches). The fact that the size of the opening was smaller than the value stamped on the orifice plate by the manufacturer meant less gas was being withdrawn from the Field through this meter than it recorded. (*Id*., pp. 10-11.)

To eliminate the over-registration by the injection meters, AmerenIP made operating procedure changes to avoid the 25% and 50% compressor loadings levels, since these were the loadings that caused the most significant over-registration on the meters. AmerenIP also relocated certain metering components to improve accuracy. These steps, which were implemented in May 2000, corrected the injection meter over-registration. (*Id*., pp. 12, 19.) To correct the withdrawal meter error, the correct value for the orifice opening was input into the meter's programmable logic controller so that it would accurately calculate the amount of gas passing through this meter. (*Id*., p. 12.)

Initially, it was determined that the over-registration at the injection meters and the over-registration due to the mis-labeled orifice opening on the withdrawal meter were approximately offsetting. (As discussed below, it was subsequently discovered that this was not the case and that the injection meter over-registration was much larger than the withdrawal meter over-registration.) (*Id*., p. 11.) The total amount of the over-registration on the withdrawal meter could be calculated with high accuracy, because it was a function of the difference between the

[7]This meter is one of the four withdrawal meters at the Field. The "primary run" is the principal withdrawal facility into the south pipeline existing the Field. The "secondary run" only operates occasionally, during high withdrawal periods. (AmerenIP Ex. 3.0, p. 10.)

actual size of the orifice opening and the incorrect size that had been stamped on the plate. (*Id*., p. 12.) In contrast, the amount of over-registration that had occurred on the injection meters could not be determined with certainty. AmerenIP estimated a range for the injection meter over-registration. The lower end of this range, 5.4%, was based on the estimate that the compressors had operated at 50% loadings 15% of the time and at 100% loadings 85% of the time. (*Id*., pp. 12-13.) The volume of the injection over-registration at this end of the range was approximately the same as the volume of the withdrawal meter over-registration. (*Id*., p. 13.)

5. Further Investigation and Analysis of Possible Structural Causes for the Hillsboro Deliverability Decline

Although the determination was reached in the Fall of 2001 (*see* §III.B.3 above) that there was not a separate structure to the northeast of the Field to which gas was migrating, this conclusion did not enable AmerenIP to rule out a reservoir or structural problem or other physical problems as the source of the deliverability decline. AmerenIP initiated additional studies and analyses focusing on other possible causes. (AmerenIP Ex. 3.0, p. 15.) Other possible reservoir or structural causes included:

- Gas was "fingering" off to the edges of the underground structure.[8]
- Formation damage had occurred in the vicinity of one or more of the gas withdrawal wells, thereby limiting the ability to access all the working gas that had been injected into the Field.[9]
- Gas was leaking from the reservoir or was being lost due to recirculation through plant equipment. (*Id*., p. 15.)

[8]"Fingering", which results in gas becoming trapped and no longer available as part of the working gas inventory, is described in §III.B.3 above.

[9]"Damage" is an industry term referring to any barrier near the well bore that restricts injection or withdrawal, due to such causes as drilling, casing, cementing operations, perforating, solids invasion, scales, fines migration, emulsions or bacteria. (AmerenIP Ex. 3.0, p. 15.)

To address the possibility of formation damage at withdrawal wells as a cause of the deliverability decline, AmerenIP performed a number of well stimulation treatments. These treatments consist of injecting chemicals into a well bore and thus into the underground reservoir to clean up or remove any damage to the formation and thereby increase productivity of the well. Well stimulations were performed on two wells in November 2000, on two additional wells in December 2001, and on two more wells in November 2002. (*Id*., p. 16.) Initially, the well stimulation treatments dramatically improved the performance of the individual wells, thus supporting the possibility that the deliverability decline was related to formation damage. (*Id*.)

AmerenIP also conducted a number of other analyses and investigations in the Spring of 2003. (*Id*., pp. 16-18.) These additional analyses and investigations included:

- Neutron log analyses – these analyses were used to determine if there was gas leakage from the reservoir to a shallower formation.[10] The neutron logs did not indicate any leakage. Additionally, a comparison of these neutron logs to neutron logs performed in earlier years indicated that the gas "bubble" in the reservoir was thinning. One possible cause of the thinning of the gas bubble was that gas was "fingering" to the edges of the underground structure. (*Id*., pp. 16-17.)

- Flame ionization surveys – these tests are conducted at ground level to identify any migration of gas at the surface that would not be detected through neutron logs. These surveys detected no gas leakage at the surface. (*Id*., p. 17.)

- Field meter versus plant meter comparison – AmerenIP compared the gas injected into the Field as measured by the main injection meters to estimates of the gas injected at the individual I/W wells, using available data from various days during the injection seasons of 1994, 1995, 1998 and 1999. (*Id*.)

- Analysis of reservoir performance – AmerenIP reviewed data on well water levels and water production over time at the Field's observation wells. This review indicated that the working gas volumes in the reservoir had declined to a level below the volume of the Field (3.1 Bcf) prior to the 1993 expansion. This

[10]A neutron log is a survey performed inside the well bore than can determine the gas saturation (i.e., the gas-water mix) within a reservoir by measuring the hydrogen ion concentration. (AmerenIP Ex. 3.0, p. 16.)

observation was an indication that the source of the deliverability decline was not a structural one. (*Id*., pp. 17-19.)

- Volumetric analysis – This technique used data on the volume of the HSF reservoir and gas saturation data from the neutron logs to develop an estimate of gas volumes in the reservoir. A comparison of the gas volumes in the Field in the Spring of 1993 to the Spring of 2002 indicated there was approximately 5.5 Bcf less gas in the Field in the Spring of 2002 than in 1993. (*Id*., p. 18.)

The field meter versus plant meter comparison and the volumetric analysis led to the conclusion that the gas volumes in the reservoir had been significantly depleted. (*Id*., p. 18.) Further, the aggregate information gained from the other analyses and activities that had been conducted, including drilling the Furness well, the crosswell seismic surveys, reanalysis of the 3-D seismic data, the well stimulation treatments, the neutron logs and the flame ionization surveys, enabled AmerenIP to rule out structural or geological problems as the source of the deliverability decline. The results of these analyses focused AmerenIP's attention on a measurement error as the source of the depletion of the gas volumes and thus of the deliverability decline. (*Id*.)

6. Determination of the Cause of the Hillsboro Deliverability Decline

As described in §III.B.5 above, the analyses AmerenIP conducted in early 2003 led to the conclusions that (i) structural or geological problems could be eliminated as the source of the deliverability decline, and (ii) a measurement error should be pursued as the cause of the depletion of gas in the Field. AmerenIP compared the gas volumes registered on the main plant injection meters to estimates (compiled as described below) of the gas volumes injected through the individual I/W well meters on various days during the 1994, 1995, 1998 and 1999 injection seasons. These comparisons indicated the main plant meters had recorded substantially more gas

as injected than had actually been injected into the Field over the 1994-1999 period.[11] (AmerenIP Ex. 3.0, p. 19.) AmerenIP therefore concluded in early 2003 that the gas in the Field had been substantially depleted due to the injection meter over-registration. (*Id*., p. 20.)

To make the comparison of the gas volumes injected at the individual I/W wells to the volumes recorded as injected by the main plant injection meters, AmerenIP used pressure and temperature data that had been recorded on charts at injection meters for the individual I/W wells. There are 14 I/W wells at Hillsboro; each well has an injection meter that records pressure and temperature data on a chart. The meters at the I/W wells do not record gas volumes into the Field, and in fact are not installed in accordance with AGA standards for custody transfer metering. (*Id*., p. 19; Tr. 63.) The data recorded on the charts from the I/W wells are used by the operators for other purposes, specifically, in adjusting methanol injection rates, opening or closing additional wells, monitoring wells and gathering line segments for hydrates, and assessing the relative contribution of each well to the total injections or withdrawals at the Field. However, the pressure and temperature data recorded on the individual I/W well charts can be used to calculate the amount of gas injected at each well. (AmerenIP Ex 3.0, pp. 19-20; Tr. 61.)

Historically, the temperature and pressure data was either not recorded or not maintained for each individual I/W well for each day. However, for those days for which well charts had been preserved for all of I/W wells that were operating that day, it was possible to combine, or "integrate", the data recorded on the individual well charts to develop an estimate of the total amount of gas injected into the Field through the I/W wells on that day. This total could then be compared to the volume of gas the main injection meters had recorded on that day. By

[11]As a result of the Peterson metering audit and the corrective actions AmerenIP took following that study (described in §III.B.4 above), the injection meter over-registration problem had been largely mitigated by early 2000. (AmerenIP Ex. 3.0, p. 19.)

comparing the injected volumes as estimated from the integrated I/W well charts to the injection volumes as recorded on the main plant meters for several days in each month over an injection season, AmerenIP was able to develop an estimate of the aggregate over-registration that had occurred on the main plant turbine meters. (AmerenIP Ex. 3.0, p. 20.)

Having concluded that the gas volumes in the Field had been significantly depleted due to the injection meter over-registration, AmerenIP developed a plan to reinject gas so as to restore the Field's gas volumes to the original post-expansion amounts. Reinjections of gas to restore the HSF inventory began in 2003. (*Id.*)

7. Summary

The foregoing discussion of AmerenIP's activities shows that the Company acted prudently in investigating the causes of the Hillsboro deliverability decline, in systematically isolating and eliminating potential causes, and in ultimately identifying the root cause and developing and implementing a plan to restore the Field to its intended levels of operation. AmerenIP investigated multiple possible causes for the deliverability decline, including structural or geological causes, which at the time the deliverability decline was identified were the most likely source of the problem, in light of the fact that the HSF reservoir had recently undergone a major expansion. However, AmerenIP did not limit its focus to structural or other problems with the underground reservoir, but rather investigated other possible causes including metering errors, damage to wells and leakage from above-ground equipment. Extensive internal and external resources were employed in the investigation. Corrective actions recommended by outside consultants for identified problems were implemented. Potential causes of the deliverability decline were eliminated based on the results of the analyses, until the Company was able to rule out potential reservoir or structural causes and establish depletion of the gas

inventory due to the injection meter over-registration as the cause. The methods used by the Company were the same as the methods used by other storage field operators in the industry to identify the root causes of declines in deliverability. (AmerenIP Ex. 5.0, p. 13.)

Further, the Company did not initiate reinjections of substantial quantities of replacement gas inventory while it was still investigating potential reservoir problems or other structural causes of the deliverability decline, because based on the information it had at the time, beginning substantial reinjections carried the risk of losing more gas outside the reservoir structure (*i.e.*, outside the area from which it could be recovered by the withdrawal wells).

The history of AmerenIP's efforts to identify and remediate the cause of the Hillsboro deliverability decline demonstrates that it conducted a very thorough and logical work program to determine the cause. (AmerenIP Ex. 5.0, pp. 4-5.) AmerenIP carried out a thorough root cause analysis. The Company followed a logical and systematic approach to determine the underlying cause of the deliverability decline. (*Id*., p. 6.)

In summary, the record demonstrates that in investigating, and ultimately identifying and resolving, the cause of the Hillsboro deliverability decline, AmerenIP exercised the standard of care that a reasonable person would be expected to exercise under the circumstances encountered by management at the time its decisions were being made and actions were being taken, based on the information available to management at those times.

C. Staff's Arguments Do Not Show That AmerenIP Acted Imprudently in Investigating, Determining and Remediating the Causes of the Hillsboro Deliverability Decline

Staff contended that AmerenIP should have concluded in 2000 that the cause of the Hillsboro deliverability decline was the injection meter over-registration, and should have begun reinjecting gas into Hillsboro in 2000 to restore the depleted inventory. (Staff Ex. 2.00, p. 20;

Tr. 56.) Had AmerenIP done so, it would have had a greater amount of working gas inventory in storage in 2004 for use in serving customers. Staff contended that AmerenIP had several opportunities to detect the "inventory problem" at Hillsboro but failed to do so: (1) AmerenIP "had in its possession" in 2000 data that indicated "a large inventory shortfall", but instead concluded that the injection and withdrawal metering errors that had been discovered offset each other. (2) AmerenIP did not place a high priority on accurate measurement for withdrawals from HSF and failed to follow guidelines to ensure accurate measurement of withdrawals from the Field. (3) The volume of gas being withdrawn from HSF in the winters of 1999-2000 and 2000-2001 was less than the amount historically withdrawn prior to the Field's expansion. (Staff Ex. 4.00, p. 5; Tr. 51-53.)

Alternatively, Staff contended that if it were determined that AmerenIP acted reasonably in waiting until it had drilled the Furness well in November 2000 to determine if there was in fact a substructure to which gas was migrating, then after the Furness well was drilled and a substructure was not found, AmerenIP should have concluded that the Hillsboro deliverability decline was due to an "inventory problem" and commenced reinjecting gas in 2001. (Staff Ex. 2.00, pp. 35-36; Staff Ex. 4.00, pp. 18-19.)

As shown below, the three specific points cited by Staff to support its position do not demonstrate that AmerenIP acted imprudently in its investigation and identification of the cause of the HSF deliverability decline, and do not demonstrate that AmerenIP acted imprudently by not beginning substantial reinjections in either 2000 or 2001. To the contrary, consideration of the circumstances facing management and the information known and reasonably available to management in this time period demonstrates that it would have been *imprudent* to begin substantial reinjections, because the very real possibility remained that the cause of the Hillsboro

deliverability decline was a structural or geological problem. Until these potential causes were adequately investigated and eliminated (or confirmed), beginning substantial reinjections of gas inventory into the Field (on the scale AmerenIP initiated in 2003) ran the risk of loss of more gas into areas from which it could not be recovered. Thus, Staff's position does not represent an appropriate application of the prudence standard, because it fails to encompass *all* the circumstances and information that Company management had to take into account in 2000, 2001 and 2002 at Hillsboro. Rather, Staff's position is based on a few isolated items of information whose significance could only be appreciated in hindsight. Moreover, Staff's position as to what the Company should have done in 2000 and 2001 has been formulated with the luxury of knowing that the HSF deliverability decline was not caused by a reservoir or structural problem – knowledge the Company did not have in those years.

Staff's specific HSF-related arguments are discussed in subsections 1 through 4 below.

1. Hillsboro Meter Study/Well Chart Data

As described in §III.B.5 and 6 above, in 2003 AmerenIP used information from the well charts for the injection meters at the individual I/W wells at Hillsboro to compare estimates of injection volumes at the individual wells to injection volumes recorded on the plant turbine meters on certain days during the 1994, 1995, 1998 and 1999 injection seasons. From this comparison, the Company determined that the turbine meters had significantly over-recorded injections. The metering at the individual I/W wells does not record the volume of gas injected, but does record temperature and pressure data that the operators use for various purposes. However, it is possible to use the recorded temperature and pressure data to calculate an estimate of the amount of gas injected at an I/W well on a day, through a process known as "integration". (AmerenIP Ex. 3.0, pp. 19-20; Tr. 61-62.)

About 1500 charts from the individual I/W wells had been "integrated" in 1994, and AmerenIP used 624 of these 1994 well charts in 2003 when it performed its comparison of injections recorded on the plant metering to injections recorded at the individual I/W wells. (*Id*, p. 23.) Based on these facts, Staff contended that when AmerenIP determined in late 1999 that the injection meter over-registration and the orifice withdrawal meter over-registration approximately offset each other, AmerenIP "was in possession of information that disputed that conclusion" and in fact "squarely pointed to a significant inventory shortfall" at Hillsboro. (Staff Ex. 2.00, pp. 22-23; Tr. 62.) Staff also criticized the basis on which AmerenIP determined that the injection meter over-registration and the withdrawal meter over-registration approximately offset each other. (*Id*., p. 23.) Therefore, Staff contended, AmerenIP should have discovered in 2000 that it had a significant measurement error at HSF, and should have begun to reinject gas to restore the inventory shortfall in 2000. (*Id*.)

Staff's contentions are based on unsupportable premises, have the benefit of hindsight, and do not demonstrate any imprudence by AmerenIP. Staff criticized AmerenIP for using, in its initial estimate of the extent of the injection metering error, what Staff contended were unsupportable assumptions that the Hillsboro compressors had run on average 15% of the time at 50% loading and 85% of the time at 100% loading.[12] (Staff Ex. 2.00, p. 21; AmerenIP Ex. 3.0, p. 22.) However, in making its calculations, AmerenIP relied on information in the Peterson Report, and estimated the compressor loading levels based on its experience as to how they had been operated over time. Since Peterson had calculated the injection measurement error for two

[12]AmerenIP had not maintained logs of the operation of the compressors on a 24-hour basis, so it did not have documentation to determine the specific number of hours the compressors had operated at the various loading levels over the 1994-1999 period. (AmerenIP Ex. 3.0, p. 22.) Staff did not criticize the Company for not maintaining historic, 24-hour-per-day logs of the levels at which the HSF compressors were loaded and operated, and did not suggest that a prudent operator would have maintained such data.

of the compressor loading steps (50% loading and 100% loading), these were the error measurements AmerenIP had available to use in developing an estimate of the overall injection over-registration. (AmerenIP Ex. 3.0, pp. 22-23.) Staff never suggested any basis on which AmerenIP could have made different or "better" estimates of the percentages of time at which the compressors had operated at various levels over the 1994-1999 period. In short, the Company's calculation of the cumulative amount of the injection meter over-registration was based on the best information it had available to make that calculation in early 2000 after the injection meter over-registration was discovered.[13]

Staff's assertion that in 1999, AmerenIP should have used the 1994 well charts from the individual I/W wells to determine that the injection meter over-registration was much larger than estimated, is also unfounded and does not demonstrate any lack of prudence. As noted above, the individual I/W wells were not installed for inventory measurement and do not actually record the volumes of gas injected at each well, but rather only record temperature and pressure data, which could be used to calculate the amount of gas injected at an individual well. (AmerenIP Ex. 3.0, p. 19; Tr. 61, 68.) Prior to the analysis performed in 2003, AmerenIP historically had not integrated and aggregated the data from the individual well charts for the purpose of determining total daily injection volumes at the I/W wells. (*Id*., p. 23.) Indeed, the I/W well meters were not set up in accordance with AGA guidelines and, as the Staff witness testified, were not reliable enough to be used to accurately calculate injections into the Hillsboro Storage Field. (Tr. 63-65.)

[13]The Company's calculation of the cumulative amount of the withdrawal meter over-registration caused by the incorrectly-labeled orifice plate Peterson had identified could be performed with a high degree of accuracy, because the amount of the over-registration was a function of the difference between the actual size of the orifice and the incorrect size stamped on the orifice plate. (AmerenIP Ex. 3.0, p. 12.)

The well charts from 1994 had been integrated for a different purpose, specifically, to use in creating individual well histories to input into the Company's reservoir simulation model of the Hillsboro Field. (*Id.*, p. 23.) Further, in the analysis that had been conducted in the mid-1990s using the 1994 charts, it was assumed that the main plant injection metering was correct and that the I/W well data was inaccurate or incomplete, and the I/W well injection data was adjusted to match the daily volumes recorded on the main plant injection meters. (*Id.*)

Moreover, the individual injection well data historically was not even recorded or maintained for each individual well for each day. (*Id.*, p. 20.) When AmerenIP did use the 1994 well chart data in its 2003 study, it only had well chart data from about 45 days to use.[14] (*Id.*, p. 23.) Additionally, in the 2003 study, the Company did not base its estimate of the amount of the inventory depletion directly on the well chart-to-plant meter comparison, but rather used this information in conjunction with the results of its reservoir simulation model for HSF. (*Id.*, pp. 24-25.) The inventory correction factor ultimately developed in 2003 was developed using the reservoir simulation model. (*Id.*, p. 28.)

Staff cited no information to indicate that it was a common (or even an occasional) practice in the gas utility industry to maintain well chart data, or to use it for the purpose of determining aggregate volumes of gas injected at a storage field's individual wells from day to day (and AmerenIP is not aware of such a practice). Nor did Staff cite any information to

[14]In order to use the well chart data to calculate the total amount of gas injected at the individual I/W wells on a particular day, it was necessary for AmerenIP to have maintained the well chart for each of the individual I/W wells that had operated on that day. Historically, this data had not been systematically maintained. (AmerenIP Ex. 3.0, p. 20; Tr. 70-71.) Thus, Staff's observation that in 2003, AmerenIP used 624 well charts from 1994, while accurate, may give a misimpression as to the amount of data the Company had available. Because there are 14 I/W wells, 624 charts represents only 45 days of injection data (*i.e.*, 624 divided by 14). In 2003, when it used I/W chart data in estimating the amount of the HSF inventory depletion, the Company had complete well chart data for only about five days per month over a period of four years. (Tr. 72.)

suggest why AmerenIP should have recognized in 2000 that well chart data could be used for this purpose. The fact that AmerenIP identified in 2003 that temperature and pressure data from the individual I/W well charts could be integrated to get a total injection volume estimate for a day, which could then be compared to the injection volumes recorded on the main plant meters for that day, in no way supports a conclusion that AmerenIP was imprudent in not recognizing this possibility in 2000. Staff's argument was not supported by any evidence that making such a comparison was a typical or even an occasional practice by the Company or the industry in general. Thus, Staff's argument was based on hindsight – knowledge acquired in 2003 that data recorded on the individual I/W well charts could be used for this purpose – and does not show that AmerenIP violated the prudence standard, *i.e.*, what a reasonable person would be expected to do under the same circumstances encountered by utility management at the time (2000).

Further, as indicated above, there was limited availability of data from the individual I/W well charts to use to develop estimates of the amount of gas injected into the Field through the individual wells. This is because such estimates could be developed only for those days on which well charts had been retained for each of the 14 I/W wells that were injecting on that day, and the well charts historically had not been systematically retained. For these and other reasons, in AmerenIP's recent gas rate case, Docket 04-0476, the same Staff witness contended that the Company's well chart analysis was not sufficiently accurate or reliable to produce an acceptable estimate of the amount of inventory depletion caused by the injection meter over-registration.[15] Specifically, he testified in that case that the inventory correction values the

[15]*See, e.g.*, the Order in Docket 04-0476 (May 17, 2005), at page 13 ("According to Staff, *the methods used by IP to calculate its Hillsboro storage field measurement errors*, the resulting actual gas inventory, the recoverable base gas withdrawal, and *the injection amounts are simply too speculative and not sufficiently accurate* to provide a reasonable basis for an adjustment to

Company calculated using the well charts were at best inexact estimates. (Tr. 67-68.) He also testified that the 22% estimate of the inventory error that AmerenIP had developed was "not reasonable". (Tr. 74.) His overall recommendation in that case was that AmerenIP's estimate of the gas measurement error was unreliable. (Tr. 74-75.)

In its Docket 04-0476 Order, the Commission accepted Staff's arguments concerning the lack of accuracy and reliability of AmerenIP's estimate of the amount of the inventory depletion that had occurred at Hillsboro due to the injection meter over-registration.[16] Moreover, in AmerenIP's appeal of the Docket 04-0476 Order, the Appellate Court affirmed the Commission's conclusion on this point on the grounds that the conclusion was based on Staff's testimony that the Company's estimate of the inventory depletion amount (*i.e.*, of the amount of the injection meter over-registration) was not accurate or reliable:

> The company contends that its determination of the amount of gas that was depleted was sufficiently reliable to justify inclusion of the investment in its rate base. The Commission disagreed with that contention and we must uphold that conclusion because it is not contrary to the manifest weight of the evidence. At the hearing, [Staff witness] *Lounsberry testified that it was unknown how much gas had been depleted from Hillsboro and that the Company's determination was not reliable. Lounsberry explained why he believed that the company's estimate in that regard could not be relied upon* . . . . The Commission ultimately adopted Lounsberry's analysis and rejected the analysis of [the Company witness] and the ALJ. . . . *The Commission's conclusions were founded upon Lounsberry's testimony* and thus, have adequate support in the record and are not contrary to the manifest weight of the evidence.[17]

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and recalculation of the value of recoverable base gas amounts" (emphasis added)) and page 14 (referring to "Staff's criticisms of the well chart analysis.").

[16]*See* the Order in Docket 04-0476, p. 27 ("Based on its review of the record and the arguments of Staff and Illinois Power, the Commission concludes that Illinois Power's base gas inventory value for Hillsboro should be rejected").

[17]*Illinois Power Co. v. Illinois Commerce Comm'n*, No. 3-05-0479 (3d Dist. May 12, 2006), slip opinion at p. 14 (emphasis added).

Given that the Commission concluded in Docket 04-0476, based on Staff's testimony, that the use of the integrated I/W well chart data (from four years, not just one year) to produce an estimate of the amount of the injection meter over-registration (and thus of the inventory depletion) was not sufficiently accurate or reliable, it would be fundamentally inconsistent to now conclude in this case that the Company was *imprudent* for failing to use the well chart data from just one year to estimate the amount of the injection meter over-registration.

Additionally, in 2003 the Company used well chart data from four different years to develop the following estimates of injection meter over-registration:

1994: 22.1%
1995: 7.0%
1998: 12.7%
1999: 8.9%[18]

Certainly, had AmerenIP in 2000 identified that it could use well chart data to attempt to estimate the amount of the injection meter over-registration, it would not have used just the well chart data from 1994 that had already been integrated, but it also would have had the well charts from 1995, 1998 and 1999 integrated, and used that information too – just as it did in 2003. But the average of the four estimates the Company developed in 2003 is only about 12.5% (much less than the estimate of 22.1% from the 1994 well chart data); and the lower end of the range shown above (7.0%) is not much larger than the estimate AmerenIP made of the injection meter over-registration in 2000 (5.4%). Thus, use of the I/W well data would not have accounted for the full amount of the inventory depletion and would not have led to a conclusion that the

[18]AmerenIP Ex. 3.0, p. 24; Staff Ex. 2.00, p. 16; Tr. 72-73. The disparate values produced for the four years was one of the reasons that Staff, in Docket 04-0476, concluded that the Company's estimate of the injection meter over-registration developed using the well chart data was not accurate or reliable.

injection meter over-registration was the sole source of the deliverability decline. (AmerenIP Ex. 3.0, pp. 24-25.)

In short, and contrary to Staff's argument, when the circumstances presented and the information available at the time are considered, there is no basis to conclude that AmerenIP was imprudent in early 2000 in failing to use the I/W well charts it had from 1994 to develop an estimate of the amount of the injection meter over-registration over the 1994-1999 period.

2. Hillsboro Withdrawal Orifice Metering

The second of the three HSF-specific facts on which Staff based its position that AmerenIP was imprudent in not beginning to reinject substantial quantities of replacement gas inventory in 2000 was that from 1993 to 1999, the Company had not inspected the orifice plates on the four *withdrawal* meters at Hillsboro. (Staff Ex. 2.00, p. 24.) Staff asserted that this was inconsistent with the Commission's regulation at 83 Ill. Admin. Code 500.180(c), although the Staff witness acknowledged that this provision is only applicable to customer billing meters, not to storage field metering, and stated that "I am not suggesting that IP violated a Commission rule." (*Id.*, pp. 25-26.) Staff also cited two AGA documents in support of its contention that AmerenIP should have inspected the orifice plates more frequently. (*Id.*, pp. 26-28.) Staff's overall conclusions were 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" (*Id.*, p. 33), and that if IP had found the orifice plate error sooner, this "would have allowed IP to focus solely on just the injection metering error" in 1999-2000. (*Id.*)

Staff's reliance on this point was misplaced and did not support its conclusion that AmerenIP was imprudent. First, the Company should not be found to have been imprudent for failing to follow regulations and guidelines which by their terms <u>do not apply</u> to storage field

withdrawal meters. Second, there is no causal connection between the Company's maintenance practices for the HSF *withdrawal* meters and the fact that it was not determined until 2003 that the cause of the Hillsboro deliverability decline was the plant *injection* meter over-registration.

a. The Regulation and Guidelines Cited by Staff Do Not Apply to the HSF Withdrawal Metering

The Staff witness testified that in maintaining the HSF withdrawal meters, AmerenIP did not follow "minimum standards" or "minimum requirements." (Staff Ex. 2.00, pp. 26, 33.) To support this assertion, he cited three documents as the standards he contended the Company should have followed. First, he cited the inspection schedules and procedures for orifice-type meters in 83 Ill. Adm. Code §500.180(c). (*Id*., p. 25.) However, as he acknowledged (Staff Ex. 2.00, Staff Ex. 4.00, p. 12), Code Part 500.180 applies only to custody transfer meters (*i.e.*, meters located at customer premises that are used to bill the customer for gas delivered). In fact the Commission has no maintenance or inspection requirements for storage field metering. (AmerenIP Ex. 3.0, p. 30; AmerenIP Ex. 3.3, pp. 20-21; Tr. 83-84.) Code Part 500 simply is not a standard that AmerenIP was required to follow with respect to its storage field withdrawal meters. (AmerenIP Ex. 3.0, p. 30.) Staff provided no explanation as to why the prudence standard would require AmerenIP (or any other utility) to expend resources complying with Commission requirements that are not applicable to the meters in question.

Second, the Staff witness also relied on an AGA document titled Report No. 3, Part 2 – Specification and Installation Requirements. (Staff Ex. 2.0, pp. 26-27.) This document, however does not contain guidelines for inspection and maintenance of orifice meters, but rather for *installation* of orifice meters. (AmerenIP Ex. 3.0, pp. 30-31; AmerenIP Ex. 3.3, pp. 19-20.) The Company in fact *installed* the four HSF withdrawal orifice meters to the standards of this AGA

document (AmerenIP Ex. 3.0, p. 30; AmerenIP Ex. 3.3, p. 20), and Staff did not dispute this fact.[19]

Third, the Staff witness cited an AGA document titled "AGA Gas Measurement Manual, Orifice Meters, Part No. 3." (Staff Ex. 2.00, p. 27.) However, this document is a guideline document only, not an industry standard, and it suggests a more frequent inspection schedule than required even by ICC Code Part 500, which does not apply to storage field metering. (AmerenIP Ex. 3.0, p. 31; Tr. 84.)

In addition to citing the three documents discussed above, the Staff witness also made a general assertion that "it is understood in the industry that in order to maintain accurate metering, frequent checking of orifice plates is necessary." (Staff Ex. 2.00, p. 28.) He did not support his assertion with any references to applicable regulations, codes or standards. The Company witnesses, who have many years of experience in gas storage field and transmission operations (AmerenIP Ex. 3.0, pp. 1-2), disputed this abstract and unsupported assertion, particularly in the context of non-custody transfer storage field metering. (AmerenIP Ex. 3.0, p. 32.) In fact, as discussed below, the circumstances of the operation of the HSF withdrawal meters indicate "frequent checking" is not necessary.

Thus, Staff did not identify any Commission regulations or industry standards applicable to non-custody transfer storage field withdrawal metering that the Company was required to follow, but did not. Further, any implication created by Staff's testimony that AmerenIP did not perform maintenance on the Hillsboro orifice meters would be inaccurate. AmerenIP had (and

[19]Additionally, when Hillsboro was expanded in 1993, the Company added instrumentation to electronically measure and perform the computation of withdrawal volumes, which improved measurement accuracy (as well as reducing processing time). (AmerenIP Ex. 3.0, p. 32.) Therefore, Staff's assertion that "IP did not place a high priority on accurate measurement for natural gas withdrawals from the Hillsboro storage field immediately after the expansion" (Staff Ex. 2.0, p. 27) is unfounded.

continues to follow) an annual maintenance procedure for the HSF withdrawal meters.[20] (AmerenIP Ex. 3.0, p. 31.)

There are a number of reasons why it is not necessary to disassemble and inspect the withdrawal meter orifice plates at Hillsboro with the frequency contended by Staff:

- At Hillsboro the withdrawal meters sit a short distance downstream of the dehydration towers; due to this location, the opportunity for contaminants to impinge or degrade the orifice plates is remote.[21] The proximity of this equipment to the withdrawal meters means that most of the contaminants should be knocked out before reaching the orifice meters. (AmerenIP Ex. 3.0, p. 33; Tr. 92-93.)

- The withdrawal meters only operate (have gas passing through them) when gas is being withdrawn from the Field, which as a general matter occurs only during the winter months (and then not necessarily every day). Further, the mis-labeled orifice plate was on the south secondary withdrawal run which is generally only operated during high withdrawal periods when the primary withdrawal runs are operating near full capacity. (AmerenIP Ex. 3.0, p. 10.) Thus, the frequency of operation of the storage field withdrawal meters is much less than the frequency of use of custody transfer meters (the type of meters to which the documents cited by Staff apply), through which gas is likely flowing almost every day of the year. (AmerenIP Ex. 3.3, p. 20.)

- In fact, from 1993 to 1999, the south secondary withdrawal run (which had the mis-labeled orifice plate) operated on only 195 days, or a total of about 6-1/2 months of operation in six calendar years. (AmerenIP Ex. 3.0, pp. 10, 32.) In other words, by late 1999 this orifice meter had not yet experienced even a year's worth of actual operation.

- Moreover, unlike a custody transfer meter at a customer's premises, the HSF withdrawal meters are monitored in operation by storage field personnel who are on site more than 40 hours per week in the withdrawal season. (AmerenIP Ex. 3.3, p. 21.)

[20] AmerenIP annually calibrates the differential transmitters of each orifice fitting, calibrates the pressure transmitters for each pipeline, checks the calibration of the resistant temperature detectors for proper temperature indication, and checks the signal tubing between the orifice fitting and the differential transmitter for fluids. (AmerenIP Ex. 3.0, p. 31.)

[21] The dehydration towers operate to remove moisture from the gas stream and therefore to remove or knock out particles or other contaminants carried in the gas stream.

- There are other, independent means of identifying potential problems with an orifice plate besides physical inspection of the plate, such as monitoring the pressure drops across the orifice openings to check that they are consistent (if one orifice has a significantly different pressure drop than the others, this would signal a potentially abnormal condition). (*Id*., pp. 33-34.)

- The more frequently an orifice meter is disassembled and the plate is removed, the greater the potential to damage the plate in handling or to re-install it improperly. (*Id*.) While a utility should expect its employees to be able to disassemble and reassemble an orifice meter without incident, opening the meter and removing the plates does involve a risk of improper re-installation which must be taken into account in evaluating the frequency of the procedure.

In fact, when the four HSF orifice plates were opened and inspected in 1999, they were found not to be degraded and were re-installed. The four plates are still in use today, subsequent inspections having shown no reason to replace them.[22] (AmerenIP Ex. 3.0, pp. 31, 33.)

In summary, the Commission regulations and the AGA documents cited by Staff were not applicable to the non-custody-transfer withdrawal meters at Hillsboro. The documents cited by Staff and the other facts and circumstances in the record show at most a difference of opinion between the Staff witness and the Company as to the maintenance and inspection practices AmerenIP should have followed with respect to the HSF non-custody-transfer withdrawal metering during the period in question. However, this evidence does not provide a basis to conclude the Company was imprudent.

[22]The Staff witness cited two papers on the potential impacts of dirty orifice plates on orifice meter accuracy. (Staff Ex. 2.00, pp. 29-30.) However, the conditions modeled or studied in these papers were not representative of conditions at the Hillsboro orifice meters. For example, the measurement error he cited from one of the papers was based on an orifice plate coated entirely on both sides with ¼ inch of valve grease. This condition far exceeded what was experienced with the Hillsboro orifice plates. (AmerenIP Ex. 3.0, pp. 34-35.) The record shows that the two papers cited by Staff were not useful or applicable references. (*Id*., pp. 35-36; *See* AmerenIP Cross Ex. 1.)

b. Earlier Discovery of the Mis-labeled Orifice Plate on the HSF Withdrawal Meter Would Not Have Led to Earlier Discovery of the Amount of the Injection Meter Over-Registration

The discussion in the preceding subsection focused on whether AmerenIP should have discovered the mis-labeled orifice plate on the HSF withdrawal meter earlier than 1999. Staff contended that if the Company had found the mis-labeled orifice plate (and thus eliminated the withdrawal metering error) sooner, it would have "focus[ed] solely" on the injection meter over-registration when it was discovered in late 1999. (Staff Ex. 2.00, p. 33.) Staff's contention was speculative and unsupported by the record. Contrary to Staff's assertions, there is no basis to conclude that if AmerenIP had discovered the mis-labeled withdrawal meter orifice plate prior to 1999, this would have resulted in the Company developing a more accurate estimate of the injection meter over-registration when it was first discovered in late 1999.

After the injection meter over-registration and the mislabeled withdrawal meter orifice plate were discovered in late 1999, the Company estimated the cumulative amounts of these over-registrations and concluded that they were approximately off-setting. However, this determination was the product of independent estimates of the impacts of the two occurrences. The determination that the amounts of the two metering errors were approximately offsetting resulted because the Company significantly under-estimated the amount of the injection meter over-registration. The cumulative amount of the withdrawal measurement error could be accurately calculated since it was simply a function of the difference between the mis-labeled orifice plate size that had been used in the metering algorithm and the actual orifice plate size (10% smaller). (AmerenIP Ex. 3.0, pp. 11-12.) The Company believed the injection over-registration and the withdrawal over-registration were approximately equal *solely* because its calculation of the injection measurement over-registration was inaccurate. That calculation was

997,000 Mcf, which was not a large amount in the absolute, and certainly was not large enough to explain the Hillsboro deliverability decline.[23] (AmerenIP Ex. 3.0, p. 38.)

Stated differently, even if the withdrawal meter over-registration had been *zero* in 1999 (because the Company had discovered and corrected it earlier or it had never occurred), the calculated injection meter over-registration would not have been large enough to cause AmerenIP, in 2000, to focus on the injection meter over-registration as the sole or even a primary cause of the deliverability decline. (*Id*..) Thus, even if the Staff witness were correct that the Company's maintenance and inspection practices with respect to the HSF withdrawal meters were inadequate, this inadequacy did not cause or contribute to the inability to determine the actual amount of the injection meter over-registration at an earlier point in time.

3. Withdrawal (Top Gas) Volumes

The third and final Hillsboro-specific fact on which the Staff witness premised his assertion that AmerenIP was imprudent in the investigation of the cause of the HSF deliverability decline was that the amount of working gas AmerenIP was able to cycle from HSF in the 1999-2000 and 2000-2001 winter seasons was less than the working gas volume of the Field prior to its expansion. He stated that "the Company missed another opportunity to identify a large shortfall." (Staff Ex. 2.00, p. 35.) However, while it is correct that in the 1999-2000 and 2000-2001 winters, AmerenIP withdrew less gas from HSF than the pre-expansion level, Staff's assertion as to the conclusion the Company should have drawn from this information was unfounded.

Specifically, the fact that AmerenIP was unable to *withdraw* more than 3.1 Bcf (the pre-expansion working gas volume) from the Field in these two winters did not tell the Company that

[23]The cumulative amount of the withdrawal metering error was 937,000 Mcf. (AmerenIP Ex.3.0, p. 38.)

the *volume* of gas in the Field had declined below 3.1 Bcf or that there was no structural problem or cause for the inability to withdraw more gas. To the contrary, there could have been adequate gas injected into HSF to support higher withdrawal levels, but the inability to withdraw more than 3.1 Bcf could have been due to reservoir/structural problems, such as injected gas migrating or fingering to locations inaccessible by the existing withdrawal wells, or formation damage to I/W wells that limited the ability to access and withdraw all the working gas inventory. (AmerenIP Ex. 3.0, pp. 38-39.) Conversely, if the total annual gas withdrawal had *stabilized* at the pre-expansion volume, this would have indicated that the true working gas volume of the existing reservoir was 3.1 Bcf and that all the additional gas injected post-expansion had been lost off structure. (*Id*., p. 39; AmerenIP Ex. 3.3, p. 9.) In neither event, however, would the fact that working gas *withdrawals* had declined to or below the pre-expansion levels signal that the cause of the deliverability decline was *not* a reservoir or structural problem.

Further, as of the 2000-2001 winter, AmerenIP was still investigating a number of plausible reservoir or structural problems, including the possible sub-structure to the northeast of the Field, gas losses into the caprock, loss of injected gas due to "fingering", and gas losses through faults or fractures in the reservoir formation. (AmerenIP Ex. 5.0, pp. 9-10.) The fact that deliverability had declined below 3.1 Bcf told the Company that a physical breach of the reservoir could have occurred during its expansion. (AmerenIP Ex. 3.0, p. 39; AmerenIP Ex. 3.3, p. 10.) Under these circumstances and with the information the Company had, it would not have been prudent to inject additional gas into HSF at that time. (AmerenIP Ex. 3.0, p. 39.)

The record with respect to this item, like the record on the first two Hillsboro-specific issues cited by Staff as the basis for its position, shows at most a difference of opinion between the Staff witness and the Company personnel who were involved in investigating the causes of

the deliverability decline as to the conclusions AmerenIP should have drawn from the reduced withdrawal volumes. This third HSF-specific item relied on by the Staff witness, like the other two, does not provide a basis for concluding that AmerenIP was imprudent in not identifying the cause of the HSF deliverability decline in 2000 and beginning to reinject replacement gas inventory into the Field in that year.

4. Even if AmerenIP Had More Accurately Estimated the Extent of the Injection Meter Over-Registration in 2000, 2001 or 2002, the Company Could Not Have Prudently Begun to Reinject Substantial Replacement Inventory Before Eliminating Possible Reservoir or Structural Causes for the Hillsboro Deliverability Decline

Even if AmerenIP had recognized in 2000 (as Staff claims it should have) that the injection meter over-registration was much larger than estimated at the time, this information would not have warranted commencing substantial reinjections of replacement gas inventory into HSF at that time. Even had the Company recognized in 2000 that the injection meter over-registration was much larger than calculated at the time, that determination would not have enabled AmerenIP to rule out reservoir or structural problems as a cause of the Hillsboro deliverability decline. As a result (and contrary to Staff's position), the Company could not have prudently commenced reinjecting significant amounts of replacement gas inventory into HSF in 2000, before completing its investigation of the potential reservoir and structural problems and eliminating such problems as causes of the deliverability decline.

As of the beginning of the 2000 injection season, the results of the 3-D seismic analysis indicated there was a substructure to the northeast of the Field to which approximately 3.5 Bcf of gas had migrated. At the time, this and other possible reservoir/structural causes were plausible causes of the HSF deliverability decline. (AmerenIP Ex. 3.0, p. 26.) The Company also knew that the Field's deliverability had declined by about 3.1 Bcf (from 7.6 Bcf to 4.5 Bcf), a decline consistent with the size of the substructure that was believed to exist. (AmerenIP Ex. 3.3, p. 4.)

Based on the information available at the time, injecting additional gas to compensate for the injection meter over-registration would have left the possibility that some or all of the additional gas injections would migrate off structure, and the deliverability problems would continue. (AmerenIP Ex. 3.0, p. 26.) Further, the injection meter over-registration, the existence of the separate substructure and the other possible reservoir/structural issues being evaluated in 2000 were not mutually exclusive. (*Id*.)

In short, in the Spring of 2000, even knowing that the injection meter over-registration substantially exceeded the withdrawal meter over-registration would not have been sufficient information to enable AmerenIP to conclude that the injection meter over-registration was the sole cause of the Field's deliverability decline, or to rule out possible structural causes. (*Id*.) The purpose of drilling the Furness well in November 2000 (as discussed in §III.B.3 above) was to confirm or reject the existence of the substructure adjacent to the main reservoir to which gas was migrating, as indicated by the 3-D seismic analysis.[24] (AmerenIP Ex. 5.0, p. 12; AmerenIP Ex. 3.3, p. 5.) It was not until the Furness well was drilled in November 2000 that AmerenIP obtained additional information to cause the existence of a substructure to the northeast of the Field to be questioned. (AmerenIP Ex. 3.0, p. 27.)

As AmerenIP witness Mr. Hower testified, "To commence reinjecting large volumes of replacement gas at this time [2000] would have been unthinkable as the Company, based on the information available to it at that time, believed that any replacement gas would migrate further away from the storage field and possibly be lost." (AmerenIP Ex. 5.0, pp. 7-8.) Given the

[24]Additional potential reservoir or structural causes of the Hillsboro deliverability decline, based on the information available to the Company in 2000, were discussed in §III.A.3 above. Further, as of Spring 2000, AmerenIP also needed to perform well stimulation treatments (which it initiated in November 2000) to address the possibility that formation damage near some of the I/W wells was causing or contributing to the deliverability decline. (AmerenIP Ex. 3.0, pp. 15-16.)

likelihood, in light of the recent expansion of the Field, that a structural problem was a cause of the deliverability decline, it was appropriate in 2000 for AmerenIP to continue with an investigation program relating to the potential structural causes, including drilling the Furness well, before making a final determination as to the cause of the deliverability problem and taking specific corrective actions or reinjecting large quantities of replacement inventory. (*Id*., p. 8.)

In fact, the Staff witness testified that, "I agree that had the Company found the inventory shortfall problem in a timely fashion the Company would have still had to consider potential problems with the reservoir or other structural problems". Nevertheless, he asserted that "this does not mean that the Company could not have started replacing the inventory shortfall in 2000", but rather that "in my opinion, the Company should have begun replacing the inventory shortfall while it was investigating whether there were other problems with the reservoir." (Staff Ex. 4.00, p. 7; Tr. 82-83.) He also contended that there were other indications that the source of the deliverability problem was an "inventory shortfall." (*Id*., pp. 7-8.) The Staff position is untenable and certainly does not indicate *imprudent* actions by AmerenIP. Given the information that AmerenIP had available in early 2000, it would have been extremely unwise for the Company to have begun reinjecting substantial quantities of replacement gas into HSF before eliminating the realistic possibilities of structural or geologic-related problems with the reservoir. (AmerenIP Ex. 3.3, pp. 2-3.) Even had AmerenIP possessed better knowledge of the full extent of the injection meter over-registration, it still would have been unwise and imprudent to being reinjecting significant quantities of replacement gas into the Field before fully investigating the implications of the data and analyses that indicated gas was migrating from the main reservoir structure to areas that were not accessible by the existing withdrawal wells. (*Id*., pp. 2-3.)

The Staff witness also argued that by reviewing observation well water levels and water production over time, AmerenIP had observed that the volume of gas in the reservoir was decreasing; and that through use of neutron logs, the Company had observed the gas bubble thinning over time, which "could be caused by gas moving away from the structure or from an inventory shortfall". (Staff Ex. 4.00, pp. 7-8; Tr. 82-83). He contended this information "would have supported the conclusion that the inventory shortfall was the cause of the problems." (*Id.*, p. 8.) However, Staff's assertion that AmerenIP should have recognized that there was an "inventory shortfall" or an "inventory problem" prove nothing:

- Based on the same data, a strong case could be built for loss of gas from the reservoir by leakage as the problem. (AmerenIP Ex. 3.3, p. 8.) Staff's own testimony recognized that the observed gas bubble thinning could have been caused by "gas moving away from the structure." (Staff Ex. 4.00, p. 8.) Yet Staff then leaped to the conclusion that only one of the two possible causes of the bubble thinning should have been adopted. (AmerenIP Ex. 3.3, p. 8.)

- More generally, "inventory shortfall" was never the cause of the deliverability problem at Hillsboro, it was the result of the problem. (AmerenIP Ex. 5.1, p. 2.) The issue confronting management was isolating why there was an "inventory shortfall." The inability to withdraw 7.6 Bcf of gas from HSF over several winter seasons (i.e., the "inventory shortfall") could have been due to previously-injected gas migrating to locations where it could not be accessed for withdrawal (as the Staff witness acknowledged in the testimony quoted above).

- Further, the water levels at the observation wells and the gas bubble thinning indicated by neutron logs, as well as the decline of the working gas volume below pre-expansion levels, are all consistent with the loss of gas from the underground reservoir by leakage. (AmerenIP Ex. 3.0, pp. 16-17.) Based on this information, the cause of the problem could have been that the structure of the expanded reservoir was different than what was originally believed, or that gas was being lost due to several possible causes such as leakage through the caprock or across a fault or fracture in the reservoir, or irregular growth of the gas bubble (fingering). (AmerenIP Ex. 5.1, p. 2.) These potential causes of the "inventory shortfall" needed to be investigated and either confirmed or ruled out before the Company could reasonably initiate specific corrective actions such as reinjecting significant quantities of replacement gas inventory.

Moreover, although the Staff witness contended that AmerenIP should have begun reinjecting inventory while it continued to investigate other possible problems at the Field, he offered no parameters as to how much gas or at what rate the Company should have reinjected while continuing to investigate other potential causes, or at what point the Company should have ceased reinjections if it had not yet identified other possible causes or ruled out all plausible causes. (AmerenIP Ex. 3.3, p. 25.)

Thus, in summary, based on the information available to it as of early 2000, AmerenIP had a reasonable basis to believe (despite the discovery of the injection meter over-registration) that there were reservoir or structural causes for the Hillsboro deliverability decline, and thus that any replacement gas the Company injected into the Field could migrate away from the reservoir and possibly be lost. (AmerenIP Ex. 5.1, pp. 1-2.) The Staff witness suggested that "the Company, in order to determine which avenue [i.e., a structural problem or an "inventory shortfall"] was the problem at Hillsboro should have started replacing inventory in the field, in order to determine the impact the replacement inventory would have, while at the same time continuing its investigation into potential reservoir problems." (Staff Ex. 4.00, p. 8.) But injecting substantial quantities of gas into a storage reservoir experiencing potential structural or geologic problems could have been a costly mistake, resulting in millions of dollars of lost gas. Rather than follow the course of action recommended by Staff in this proceeding (a recommendation developed after the fact with the benefit of hindsight), AmerenIP took a cautious approach at the time based on the information available to it and the potential reservoir and structural causes of the deliverability decline that had not yet been investigated and eliminated.

The Staff witness acknowledged the possibility that the Commission could conclude it was reasonable for AmerenIP not to begin reinjecting replacement inventory until it had drilled the Furness well in November 2000. (Staff Ex. 2.00, p. 37.) He also testified, "I agree that the results of the Furness # 1 well drilling did not necessarily eliminate the potential that other problems existed at the Field." (Staff Ex. 4.00, p. 19; Tr. 83.) However, he asserted that once the Furness well was drilled and did not locate the substructure that had been indicated by the 3-D seismic analysis, AmerenIP should have recognized that there was no reservoir problem and that "the Furness #1 well completely invalidated the structural variance theory." (Staff Ex. 2.00, p. 36.) He asserted that at this point there could not have been any other problem at the Field besides an "inventory problem."[25] (*Id*.) Once again, however, the Staff witness's assertion does not demonstrate imprudence, because he failed to take into account all the information the Company was trying to evaluate at the time.

Although drilling the Furness well in November 2000 did not locate a substructure in the area indicated by the 3-D seismic analysis, this result did not invalidate the possibility of a reservoir or structural cause, and it did not even invalidate the conclusion as to the existence of the substructure. (AmerenIP Ex. 3.0, pp. 28-29; AmerenIP Ex. 5.0, pp. 15-16.) Nor did it eliminate the possibility that there were still deliverability issues based on the structure of the Field. (AmerenIP Ex. 3.0, p. 29.) It only specifically confirmed that there was not a substructure at the location indicated by the 3-D seismic analysis. It did not invalidate the more general conclusion developed from the 3-D seismic data, namely, that gas was migrating away from the

[25]AmerenIP disputes Mr. Lounsberry's conclusion, as discussed immediately below. However, if in fact drilling the Furness well in November 2000 is the event that should have caused the Company to recognize that the HSF deliverability decline was not due to a reservoir or structural problem, then AmerenIP could not be expected to have commenced reinjecting gas until 2001 at the earliest, not during the 2000 injection season.

main reservoir to other structures. (AmerenIP Ex. 5.0, pp. 15-16; AmerenIP Ex. 5.1, p. 5.) After drilling the Furness well, the Company had conflicting information – the 3-D seismic analysis, which indicated the existence of a substructure to which approximately 3.5 Bcf of gas had migrated, and the results of drilling the Furness well, which did not confirm the existence of the substructure in the anticipated location. It was therefore necessary to have the 3-D seismic analysis results reinterpreted. (AmerenIP Ex. 5.0, p. 16; AmerenIP Ex. 3.0, p. 29; AmerenIP Ex. 3.3, p. 5.) The re-interpretation could have concluded that the substructure was in a different location than originally determined. (*Id.*; AmerenIP Ex. 3.0, p. 29.) Further, had it been the case that the general conclusion originally drawn from the 3-D seismic analysis – that there was a substructure to which gas was migrating – was correct, then beginning substantial reinjections after drilling the Furness well would have only resulted in more gas migration and more losses.[26] (AmerenIP Ex. 5.0, p. 16; AmerenIP Ex, 3.3, pp. 5-6.)

In order to have the 3-D seismic analysis reinterpreted and resolve the conflicting information, it was necessary to gather additional data, by performing crosswell seismic surveys involving the Furness well and two other wells. (AmerenIP Ex. 3.0, p. 29; AmerenIP Ex. 5.0, p. 16.) A crosswell seismic survey, performed in a specific area, is a higher resolution process than the basic 3-D seismic process that was used to develop a profile of the entire reservoir. (AmerenIP Ex. 3.0, pp. 14, 29.) The crosswell seismic surveys were performed in June 2001.

[26]Contrary to Staff's assertions (*see* Staff Ex. 2.0, pp. 35-37), the fact that AmerenIP did not observe migrating gas at the observation wells located around the perimeter of the Field did not invalidate the possibility of a separate sub-structure to which gas was migrating, either. The observation wells do not form a continuous "wall" around the perimeter of the storage field, but rather are drilled around the edge of the Field primarily for the purpose of measuring reservoir pressures. The individual observation wells are miles apart. The 3-D seismic data indicated structural features such as high and low points in the shape of the reservoir that could provide routes for gas migration that would never be detected by the observation wells. (AmerenIP Ex. 5.0, pp. 16-18.)

(*Id*., p. 29.) Thereafter, using the results of the crosswell seismic surveys, the original 3-D seismic data were re-analyzed it and the conclusion was reached that there was not a separate substructure. This re-analysis was completed in the Fall of 2001. (*Id*., pp. 14, 29.)

However, even at this point (Fall 2001), the possibility of a reservoir or structural problem as the cause of the Hillsboro deliverability problems could not be eliminated. Several remaining reservoir or structural possibilities that could have been causing the deliverability decline remained, including formation damage in the wells; gas losses to the caprock; gas migration via faults or fractures in the reservoir; or fingering of gas away from the withdrawal wells or other irregular growth of the gas bubble. All of these were very plausible causes that had not yet been eliminated. (AmerenIP Ex. 3.0, p. 30; AmerenIP Ex. 3.3, p. 6; AmerenIP Ex. 5.0, p. 18.) The results of drilling the Furness well did not rule out any of these potential structural causes for the HSF deliverability decline. (*Id*.) Indeed, the Staff witness acknowledged that "the results of the Furness #1 well drilling did not necessarily eliminate the potential that other problems existed at the field." (Staff Ex. 4.00, p. 19.)

In the Fall of 2001, therefore, additional analyses and studies were still needed to eliminate these remaining possible structural causes for the deliverability decline. (AmerenIP Ex. 3.0, p. 30.) It was very important, and prudent, for AmerenIP to continue to investigate the root cause of the HSF deliverability decline, so that the proper corrective actions could be taken, before beginning significant injections of replacement gas inventory. (AmerenIP Ex. 5.0, p. 14.) As described in §III.B.5 above, these additional analyses and studies were completed by the early Spring of 2003. (*See* AmerenIP Ex. 3.0, pp. 16-20.) If any of the potential causes had remained -- which had not been ruled out as of the 2001 and 2002 injection seasons – beginning substantial reinjections of the gas inventory shortfall would have resulted in additional gas losses

as well as potential environmental damage. (AmerenIP Ex. 5.0, p. 18.) In short, it would not have been prudent for the Company to have followed the course of action suggested by Staff in 2001 or even in 2002, *i.e.*, to begin reinjections while continuing to investigate potential reservoir and structural problems . (*Id*.)

Here again the Staff witness and the Company have a difference of opinion as to whether the Company should have begun reinjecting significant amounts of replacement gas into HSF in 2000 or, alternatively, in 2001 after drilling the Furness well. However, a difference of opinion is not sufficient basis to find the Company imprudent or to impose a disallowance.[27] Moreover, the Staff witness's opinions were arrived at with the benefit of hindsight – the knowledge that the completion of the Company's investigations in 2003 showed there was no reservoir or structural problem causing the deliverability decline. In contrast, the Company's actions were based on the circumstances existing and the information available to it in 2000, 2001 and 2002. Unlike the Staff witness's opinion that AmerenIP should have begun reinjecting significant amounts of replacement gas inventory into HSF in 2000 or, alternatively, in 2001, Company management did not have the luxury in those years of knowing that gas was not leaking or migrating from the reservoir area or otherwise becoming unrecoverable from the existing withdrawal wells, due to breaches in the reservoir structure, existence of unknown substructures, fingering or unusual development of the gas bubble, or other reservoir or structural problems. Therefore, the Company took a cautious approach to reinjections. Based on the circumstances and the information available to management at the time, the fact that AmerenIP did not begin reinjecting significant amounts of replacement gas inventory into HSF in 2000 cannot be

[27] *Illinois Commerce Comm'n v. Commonwealth Edison Co.*, Docket 84-0395 (Oct. 17, 1987), p. 17; *Illinois Power Co. v. Commerce Comm'n*, 339 Ill. App. 3d 425, 435 (5th Dist. 2003).

considered imprudent. Certainly, the Company should not be found to have acted *imprudently* based on the cautious approach it took.

D. The Staff Witness's "Overall Storage Concerns" Do Not Demonstrate That AmerenIP Was Imprudent in its Investigation and Remediation of the Hillsboro Deliverability Issues

In addition to the Hillsboro-specific facts and events discussed in §III.C and D above, the Staff witness also cited several "overall storage concerns" in support of his contention that AmerenIP had been imprudent in its investigation and determination of the cause of the Hillsboro deliverability decline. Specifically, he cited (i) the fact that AmerneIP had reduced the peak day rating of Hillsboro and had also reduced (for one season) the peak day rating of the Shanghai Storage Field; (ii) a reduction in the number of supervisors at the IP storage fields over the period from 1991-2000; (iii) a reduced level of capital expenditure budgets for the storage fields in 2002-2004 compared to earlier years; and (iv) a purported inability to adequately identify problems. (Staff Ex. 2.00, pp. 37-55.) As discussed below, none of these "overall storage concerns" are valid. More generally, other than making general, unsupported assertions, the Staff witness showed no causal connection between any of these "concerns" and the Hillsboro deliverability decline or the speed with which AmerenIP investigated, identified and remediated the cause of the deliverability decline.

1. Reduction in Peak Day Capacity

The first "overall storage concern" was that on two occasions, AmerenIP has reduced the peak day capacity of a storage field. (Staff Ex. 2.00, pp. 38-39.) One of those instances is the reduction in Hillsboro's peak day capacity that is at issue in this case.[28] Since the events leading to the HSF capacity reduction are at issue in this case, whether it occurred as a result of

[28]The HSF peak rating was restored to its full value prior to 2004.

imprudent actions should be decided on the basis of the specific facts and circumstances discussed in §IV.B and C above, and not on the mere fact that the capacity rating was reduced.

The other occurrence was the reduction of the peak day capacity of the Shanghai Field for one season, the 2001-2002 winter. (Staff Ex. 2.00, p. 39.) This capacity reduction was specifically at issue in the Company's PGA reconciliation case for 2001, Docket 01-0701, where the same Staff witness recommended the Commission find the Shanghai capacity reduction occurred due to imprudence. However, in its Order in Docket 01-0701 the Commission *rejected* the Staff recommendation and affirmatively found that the Company had acted reasonably and prudently in reducing the peak day capacity of Shanghai for the 2001-2002 winter. (Order in Docket 01-0701, Feb. 19, 2004, p. 25.) This determination was made on the basis of an extensive review of the facts relating to the causes for the temporary reduction in Shanghai's peak capacity and the Company's actions. (*Id*., pp. 7-11, 16-19, 22-25.) In light of this prior, specific Commission finding, there is no basis for using the Shanghai capacity reduction in the winter of 2001-2002 as grounds for an imprudence finding against AmerenIP in 2004 relating to a different storage field.

The Staff witness asserted that reduction of the capacity of a storage field is an "uncommon event" and thus "is not a positive indication" of the utility's management or oversight over the storage facility. (Staff Ex. 2.00 p. 39.) His assertion that reduction of the capacity of a storage field is an "uncommon event" is incorrect. Deliverability decline has been reported to be the most common problem in the gas storage industry. (AmerenIP Ex. 5.0, p. 19.) According to information published by the U.S. Department of Energy ("DOE"), based on more than 350 U.S. storage reservoirs, most gas storage operators experience a loss in deliverability over time. (*Id*.) As an indication of the significance of this problem, the DOE has funded

research to attempt to address the causes of declining productivity experienced by gas storage reservoirs over time. (*Id*.) Staff's characterization of the reduction in the capacity of a storage field as an "uncommon event" is not consistent with the experience of the U.S. gas storage industry. (*Id*., pp. 19-20.)

2. Manpower (Storage Field Supervisors)

The second "overall storage concern" cited by Staff was that "manpower levels at the Company's storage field operations changed over time". (Staff Ex. 2.00, p. 41.) Specifically, while the number of storage field operators has remained constant since 1991, the number of storage field supervisors was reduced from three or four during the 1991-1995 period to one in 2000. (*Id*.) Without citing any specific facts, the Staff witness made a general assertion that "IP's reduction in oversight has caused it to operate its storage fields in a manner that is not safe, reliable and efficient." (*Id*., p. 42.)

However, the Staff witness did not show any relationship between the reduction in the number of supervisors and the HSF deliverability decline, and there is no such relationship to be shown. In 1991 the Company had a total of 16 storage field operators and three supervisors. The number of supervisors was reduced to two in 1995 and to one in 2000. Throughout this period, a staff of 16 operators was maintained. As of January 2003, AmerenIP had 16 storage field operators and one supervisor, for a total of 17 employees at the storage fields, only two less than in 1991. (AmerenIP Ex. 2.2, p. 12.)

The reduction in number of supervisors occurred in conjunction with the adoption, in 1995, of a new manpower plan that included upgrading one of the operator positions at each storage field to a foreman's position. The manpower plan embodied a self-directed work team approach in which the work team for each storage field is responsible and accountable for the

functions to be performed at the field to provide safe and reliable service. (*Id*., p. 13.) AmerenIP's storage field operators have more than 240 total years of gas storage experience (*id*.), which provides a strong foundation to carry out their responsibilities under the self-directed work team model.

In addition to the employees at the storage fields, throughout this period the Company has had a manager of storage who was responsible for supervision of all of the storage fields, as well as engineering and administrative personnel on its headquarters staff whose responsibilities include the storage fields. (*Id*., pp. 13-14.) The Company used outside consultants and contractors for specific projects and studies relating to the storage fields, including unusual problems or occurrences that may arise at a storage field. (*Id*., p. 14.) Using outside consultants and contractors and headquarters engineering personnel to investigate and analyze such problems and occurrences minimizes the need to distract personnel at the storage fields from their day-to-day operating responsibilities.

Nothing in the record supports the Staff witness's assertion that the reduction in number of storage field operators caused the Company to operate its storage assets in a manner that is not safe, reliable and efficient. AmerenIP's storage fields have an excellent safety record, as indicated by these facts:

- From 1994-2004, the Company had only three lost time accidents at its storage fields, with no lost time accidents from August 1998 through 2004. (AmerenIP Ex. 2.2, p. 15.)
- The Company has never had an incident which endangered public safety at any of its storage fields. (*Id*.)
- The Company's storage field operators have received extensive training on numerous safety-related topics. (*Id.*)
- The Commission's Office of Pipeline Safety ("OPS") performs annual audits of each AmerenIP storage field, including all records at each field and verification

> that leakage surveys and pipeline patrols have been performed. OPS issued only one "Non-Compliance" and two "Observations" in total to the Company for all seven of its storage fields for 2002-2004. The issues involved in these findings were minor and the Company addressed them immediately. (*Id*., pp. 15-16.)

Additionally, over the period cited by the Staff witness, the Company improved the efficiency of its storage fields through capital improvement projects. (AmerenIP Ex. 3.3, p. 16.) AmerenIP has increased efficiencies at its storage fields by implementing advanced technologies as they have become available. (*Id*., p. 19.) The Company has improved the automation and remote control features of the control systems for the storage fields; all of the storage fields now have updated control systems that have been installed over the past eleven years, with the control system upgrade for the final storage field completed in 2004. (*Id*.) The upgraded control systems make the storage plants more efficient operationally and improve AmerenIP's ability to monitor their operations, both on-site and from the central gas dispatch center. As a result of these capital improvements, the gas system dispatchers can now monitor the status and operations of the storage fields. (*Id*.) AmerenIP has also adopted a standardized set of operations software which enables operators from one field to go to any other field and control it. (*Id.*)

In response to all the foregoing information, the Staff witness provided no facts to in any way link the level of staffing at the storage fields to the speed and aggressiveness with which AmerenIP investigated, determined and remediated the causes of the Hillsboro deliverability decline. Moreover, AmerenIP witnesses Hood and Kemppainen, who were directly involved in the investigation and remediation of the Hillsboro deliverability issues, testified:

> [W]ith respect to the impacts, if any, of the reduction in the number of storage field supervisors on the Company's ability to determine the causes of the Hillsboro and Shanghai deliverability declines, we have been involved in the investigation, discovery and remediation of the problems that led to the temporary reduction of peak day capacity at Hillsboro and Shanghai and the deliverability decline at Hillsboro. Based on our involvement, we do not believe there is any connection between the reduction in the number of storage field supervisors and

> the reduction of peak day capacity and deliverability or the time it took to determine the root cause of the problems. To the contrary, Illinois Power diligently investigated the source of the declining performance at the Hillsboro Field over a number of years until it was identified and corrected. These efforts were not hampered by a lack of supervisory resources. Similarly, there is no causal connection to support Mr. Lounsberry's assertion in the "Conclusion" to the "Overall Storage Concerns" section of his testimony (lines 1248-1249) that "After reducing its manpower levels, IP's ability to identify and act upon problems at its storage fields declined." (AmerenIP Ex. 3.0, p. 40.)

Staff's assertions concerning manpower do not support any conclusion that AmerenIP was imprudent in its investigation, determination and remediation of the Hillsboro deliverability decline or that the Company should have discovered the source of the deliverability decline and begun to replace the depleted inventory sooner that 2003.

3. Capital Expenditures

The Staff witness's third "overall storage concern" was that the Company's capital expenditures for its storage fields have decreased. He specifically pointed to the storage field capital expenditures for 2002 through 2004 which were lower than the levels in 2000 or 2001 and among the lowest years for storage field capital expenditures during the period 1995-2004. He stated that he was "concerned that IP is being reactive rather than proactive when determining when to make upgrades or other improvements at its storage fields", which, he asserted, "has contributed negatively to IP's ability to maintain its storage operations." (Staff Ex. 2.00, pp. 44-45; Tr. 54-56.)

The Staff witness's contention that AmerenIP's levels of capital expenditures "has contributed negatively to IP's ability to maintain its storage operations" was another unsubstantiated assertion. As with the assertion concerning manpower levels, he provided no facts demonstrating a causal relationship between the Company's storage field capital

expenditure levels and the speed with which the cause of the Hillsboro deliverability decline was investigated and identified.

AmerenIP Exhibit 2.4 showed the Company's annual storage field capital expenditures, on both a direct cost and loaded (i.e., with overheads charged to construction) basis, for the years 1995-2003. The capital expenditures have fluctuated over this period, and were higher in those years in which large, one-time projects were completed. (AmerenIP Ex. 2.2, p. 16.) IP Exhibits 2.5 and 2.6 provided a list of the storage field capital improvement projects, and a list of studies concerning the storage fields, that were completed over this period. The Company witness identified the specific large, one-time projects that were completed in those years that had higher capital expenditures. (AmerenIP Ex. 2.2, pp. 16-17.) AmerenIP has been proactive in identifying and correcting problems at all of its storage fields, and has initiated numerous projects to avoid potential problems while trying to ensure maximum deliverability ratings.[29] (*Id*., p. 17.)

Due in part to the completion of several major capital project initiatives over the period 1995-2001, the Company simply did not identify any additional major projects that warranted capital expenditures in 2002 and 2003. (*Id*., p. 18.) The year-to-year storage field capital expenditures over the 1995-2003 period are exactly what one would expect to see in the context of a relatively small gas system segment, that is, annual capital expenditures have been high in those years when specific, major capital projects are implemented and lower in years in which there is not a major project being implemented. The Company has not established its capital budgets in a manner intended to show relatively constant levels of spending from year to year,

[29]AmerenIP Ex. 2.5 listed numerous projects that replaced or upgraded storage field facilities and equipment or installed new facilities and equipment. *See also* the discussion of the new control, monitoring and dispatch systems the Company has controlled in §III.D.2 above.

but rather has budgeted and scheduled significant larger projects as needed, which accounts for the year to year fluctuations in capital expenditures. (*Id.*, p. 17.) In addition, the Company witness testified that in his experience in a management position through four annual budgeting cycles, a requested storage field capital project was never rejected by Company management due to capital budget limitations. (*Id.*, p. 18.)

AmerenIP Exhibit 2.7 showed AmerenIP's annual storage field O&M expenditures and combined capital and O&M expenditures for 1995-2004. Amounts spent on O&M, like capital expenditures, contribute to the ability of the storage fields to operate in a safe, efficient and reliable manner. (AmerenIP Ex. 2.2, p. 20.) This exhibit showed that the Company's storage field O&M expenditures in each of the years 2001 through 2004 were higher than in any of the preceding six years (1995-2000). (*Id.*, p. 21; AmerenIP Ex. 2.8.) Further, although Staff asserted that AmerenIP may have been "reactive not proactive" in maintaining its storage fields, many of the activities that would initially be undertaken to investigate a problem at a storage field, such as hiring a consultant to conduct a review or perform a study, would typically be expensed, not capitalized. (AmerenIP Ex. 2.2, pp. 20-21.) The Staff witness was well aware of the Company's storage field O&M spending history over the 1995-2003 period, having requested and received through discovery information on the annual O&M expenditures, yet he expressed no criticism of the Company's storage field O&M expenditure levels. (Tr. 107-108.)

The Staff witness contended that AmerenIP may have been "reactive rather than proactive" in making improvements at its storage fields because it does not earn a return on capital investments until its next rate case, whereas gas supply costs are automatically recovered through the PGA. (Staff Ex. 2.00, p. 44.) However, the high, and generally increasing, levels of the Company's annual storage field O&M expenses disproves this accusation. O&M expenses

are not recovered through the PGA. (Tr. 108-109.) If, between rate cases, a utility spends more in O&M than was included in the revenue requirement in its last rate case (which for AmerenIP, prior to the 2004 reconciliation year, was 1993-1994), the utility can *never* recover from its customers the increased O&M costs it incurs during the period between rate cases. Yet, AmerenIP's storage field O&M expenditures generally increased over the 1995-2004 period.

In the face of all this information, the Staff witness was unable to identify any capital projects that AmerenIP should have undertaken but did not, including any projects that would have enabled the Company to identify and remediate the cause of the Hillsboro deliverability decline sooner. (AmerenIP Ex. 2.2, p. 20.) Moreover, the years he pointed to in which capital expenditures were lower (2002-2004) do not correlate to the years in which he asserted there was imprudent management at HSF. The years 2000 and 2001 are the years in which, the Staff witness contended, the Company should have discovered the cause of the HSF deliverability decline, yet 2000 and 2001 were two of the years with *higher* storage field capital expenditures. (*See* AmerenIP Ex. 2.4.) Obviously, the inability to determine the cause of the HSF deliverability decline by 2000 or 2001 were not caused by lower levels of capital expenditures in *2002 and 2003*.

In any event, there is absolutely no evidence that AmerenIP's investigation of the cause of the Hillsboro deliverability decline was hampered by any lack of capital resources. As Company witnesses Hood and Kemppainen testified:

> [B]ased on our personal involvement in attempting to ascertain the cause of the Hillsboro deliverability decline, the failure to discover the underlying cause sooner did not result from the failure to undertake any particular capital projects or from the level of capital expenditures generally. As we have described in this testimony [IP Ex. 5.0], Illinois Power devoted considerable internal and external resources to determining the source of the Hillsboro performance decline. (AmerenIP Ex. 3.0, p. 41.)

Similarly, AmerenIP witness. Shipp testified that:

> [I]n the one area that is specifically at issue in this case, i.e., the deliverability decline and inventory depletion of the Hillsboro Field, Illinois Power was extremely proactive, over an extended period of time, in trying to identify and correct the root causes of the problem. Mr. Lounsberry has not identified any capital projects, in either this case or in Docket 04-0476, which he contends could have enabled IP to identify and remediate the HSF deliverability issues sooner but which IP failed to undertake, for budgetary or any other reasons. In fact, Mr. Lounsberry contends that IP should have determined the cause of the Hillsboro deliverability decline by 2000 or 2001 at the latest, and yet the Company's storage field capital expenditures for the years 1997 through 2001 were at levels he apparently believes were acceptable. (AmerenIP Ex. 2.2, pp. 19-20.)

4. Identification of Problems

The Staff witness's final "overall storage concern" was that he questioned "IP's ability to identify problems or conduct thorough root cause analyses at its storage fields." (Staff Ex. 2.00, p. 45.) His concern was based on two specific occurrences: (1) a December 2000 incident at Hillsboro in which a produced water tank became overpressurized and was launched from its foundation, and (2) the fact that, while the Hillsboro injection meters were recording more gas being injected into the Field than was actually the case over the 1993-1999 period, the Company did not recognize that additional volumes of gas were entering its system (rather than being injected into the storage field). (*Id*.)

a. December 2000 Hillsboro Incident

The Staff witness contented that AmerenIP failed to conduct an adequate investigation of the root cause of the December 2000 Hillsboro incident, which he contended was evidence of poor management oversight.[30] (Staff Ex. 2.00, p. 52; Staff Ex. 4.00, p. 30.) His characterization of the Company's actions, and his conclusion, are wrong for numerous reasons:

[30]Although the damage to plant facilities caused by this incident reduced the Hillsboro Field's deliverability from December 16, 2000 to January 16, 2001, Staff did not propose any

- Within two days following the December 16 incident, the Company hired a qualified outside consulting firm, Packer Engineering, which is a recognized forensic engineering expert[31], to conduct an investigation of the incident and submit a report, which Packer did on February 14, 2001. (AmerenIP Ex. 3.0, pp. 41-42; Tr. 111-112.) The Staff witness did not question Packer Engineering's qualifications to conduct this investigation. (Tr. 112.)

- Packer Engineering's report identified a specific root cause of the explosion. (*Id*., p. 42.)

- The Commission's OPS conducted a thorough, independent investigation of the December 2000 incident and issued a report, but did not make any findings of violations or non-compliances by AmerenIP, nor find any fault with the quality or completeness of the Company's or Packer's investigation. (AmerenIP Ex. 3.2; AmerenIP Ex. 3.0, pp. 46, 48.) In fact, the OPS report relied heavily on information contained in the Packer report and on other information gathered by IP in its investigation. (AmerenIP Ex. 3.0, p. 43; AmerenIP Ex. 3.3, pp. 23-24.)

- Based on its investigation, including the recommendations of the Packer Report as well as the ICC OPS report, AmerenIP implemented a number of corrective actions for the purpose of preventing a repeat of the December 16 incident. (These corrective actions were listed at pages 46-47 of AmerenIP Exhibit 3.0.) Neither the ICC OPS, the Staff witness in this case or any other Staff member has ever criticized the sufficiency or completeness of AmerenIP's corrective actions. (*Id*., pp. 46-48; AmerenIP Ex. 3.3, pp. 23-24; Tr. 113.)

- The corrective actions AmerenIP has implemented are sufficient to prevent tank failure under the circumstances experienced on December 16, 2000, and to prevent re-occurrence of the circumstances that the Staff witness believed to be the root cause of the December 2000 incident. (AmerenIP Ex. 3.3, pp. 24-25.)

Although the Staff witness stated that "Without conducting a thorough review of what actually happened, IP cannot be assured that it took appropriate corrective actions" (Staff Ex. 4.00, p. 30), in the four dockets in which he has raised this same issue, he has never identified any respect in which he contended that AmerenIP's corrective actions were insufficient or

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disallowances relating to this incident in either the 2000 or 2001 PGA reconciliation cases, and of course none were imposed by the Commission. (AmerenIP Ex. 2.2, p. 9.)

[31]Packer Engineering specializes in investigating the causes of accidents involving chemicals, metallurgical failures, fire, explosions and similar circumstances. (AmerenIP Ex. 3.0, pp. 41-42.)

incomplete, nor identified any additional corrective actions that he believes the Company should have implemented. (AmerenIP Ex. 3.0, pp. 47-48; AmerenIP Ex. 3.3, p. 25.) The Staff witness criticized the sufficiency of the Company's root cause analysis of the December 2000 incident, but the purpose of a root cause analysis is to identify corrective and preventative actions that can be taken to prevent the incident from occurring again. The Company implemented numerous corrective and preventative actions following the December 2000 incident, based on its investigation, and the sufficiency and completeness of these actions has not been questioned. (AmerenIP Ex. 3.0, p. 48.)

In any event, there is no connection between the December 2000 incident or its causes and the injection metering over-registration that was the cause of the HSF deliverability decline. Even if the Commission were to conclude that AmerenIP's investigation of the root cause of the December 2000 incident was insufficient or not aggressive enough (a conclusion for which there would be no basis), this would provide no grounds to question the sufficiency and diligence of the Company's investigation into the causes of the HSF deliverability decline, or to question the sufficiency of the resources and attention the Company devoted to it.

b. Gas Dispatch Tracking

The Staff witness noted that over the period the Hillsboro injection metering over-registration was occurring, approximately 1 Bcf of additional gas per year on average entered AmerenIP's gas system (rather than being injected into the Field), but was not noticed by the Company's gas dispatchers. He asserted that this was an "example of IP's failure to adequately oversee its operations." (Staff Ex. 2.00, p. 56.)

However, when the 1 Bcf of gas is translated to a daily amount, it can be seen why this additional amount of gas would not be identified by the gas dispatchers. The 1 Bcf of gas

equates to about 4,000 Mcf per day on average during the injection season. (AmerenIP Ex. 2.2, p. 22.) During the months of April, May, October and November, AmerenIP's purchased gas volumes (including gas for storage) are approximately 300,000 Mcf to 400,000 Mcf per day. An incremental amount of 4,000 Mcf per day during this period would not stand out as a significant error. (*Id*., p. 23.) Further, in addition to the Company's gas purchases (for its system supply customers), customer-owned (transportation) gas also enters the system each day. On a real-time basis, the dispatchers cannot distinguish between deliveries for transport customers and other deliveries entering the system. (*Id*.) Thus, an incremental amount of 4,000 Mcf per day would be even less apparent against the combined daily deliveries of transport customer purchases and AmerenIP gas purchases.

Further, AmerenIP's retail transportation tariff, Service Classification 76, as in effect during the 1993-1999 period, allowed transportation customers a daily variance of 50% between nominations and deliveries, which equates to a potential difference between aggregate nominations by and aggregate deliveries for transportation customers of 30,000 Mcf to 35,000 Mcf in a day. This variance is far in excess of the 4,000 Mcf average daily measurement error that occurred at Hillsboro. (*Id*.; AmerenIP Ex. 2.8, p. 12.) Moreover, on any given day the line pack in AmerenIP's gas system could be up to 10,000 Mcf. Thus, the average daily amount of excess gas, 4,000 Mcf, that entered the AmerenIP system due to the metering error was less than the amount of line pack in the Company's system. (AmerenIP Ex. 2.2, pp. 23-24.)

During the summer months (June-September), the amount of gas entering the system (utility purchases plus transport customer gas) is less, due to lower end-user demand, and is in the range of 220,000 Mcf to 280,000 Mcf per day. (*Id*., p. 24.) Again, a variance of 4,000

Mcf/day would not be noticeable in the context of these incoming daily volumes and the other factors mentioned immediately above. (*Id*.)

Finally, although the AmerenIP gas dispatchers may know what the total pipeline deliveries to the Company are on any given day, they do not know the actual customer consumption on a given day to enable them to compare the two values to determine if load equals deliveries. (AmerenIP Ex. 2.2, p. 24.) The vast majority of AmerenIP's end use customers are not metered on a daily basis but rather on a non-calendar month basis. (*Id*.) Therefore, the dispatchers do not have the means to compare total daily deliveries from the pipelines to total daily deliveries to customers (system supply plus transport) to see if there are significant variances between the two values.

The Staff witness attempted to bolster his contention that AmerenIP's dispatchers should have seen an average measurement error of 4,000 Mcf/day, by presenting an analysis based on gas volumes on the system during a one-week period in July. (Staff Ex. 4.00, p. 31-32.) His presentation, however, was flawed and incomplete. Specifically, he compared the average daily measurement error to *only* the daily throughput for *non-transportation customers* (i.e., IP's system supply load), and failed to include the gas delivered for transportation customers. (AmerenIP Ex. 2.8, pp. 11-12.) As noted above, the dispatchers are not able to distinguish on a daily basis between gas delivered for transport customers and gas delivered for system supply customers, but rather would see only the total deliveries to the system.

In his rebuttal testimony, the Staff witness attempted to change his approach by presenting an analysis based on the estimated 1.5 Bcf metering error experienced in 1994.[32]

[32]The annual error of 1.5 Bcf was the highest estimated error in any year of the six-year period. The estimated average annual error at HSF over this period was slightly under 1.Bcf, much closer to the 1 Bcf figure used in the Staff witness's original analysis. (AmerenIP Ex. 2.8, p. 8.)

(Staff Ex. 4.00, pp. 31-32.) However, his new analysis was flawed just like his original analysis because he continued to compare the amount of the metering error only to gas sales data rather than to data on deliveries to the system for sales plus transportation customer load plus injections to storage, which is the incoming gas that the dispatchers see. (AmerenIP Ex. 3.3, p. 8.) In 1994, the year on which the Staff witness's analysis was based, the total metering error was only 1.7% of the total gas delivered to AmerenIP's city gate.[33] (*Id*., pp. 8-9.) Additionally, for 1994, the total estimated injection metering error translated to about 7,100 Mcf per day during the injection season. For the reasons discussed above in connection with Staff's original analysis, this daily amount would not stand out to the Company dispatchers as a significant error in the context of the total gas volumes entering the system on a daily basis. (*Id*., p. 9.)

AmerenIP Exhibit 2.9 showed the gas delivery volumes to the system for each day of the 1994-1999 injection seasons, the actual average daily measurement error for that year, and the average daily measurement error as a percent of deliveries for each day.[34] On average, the daily measurement error as a percent of pipeline deliveries was 4.3% in 1994, 2.5% in1995, 2.4% in 1996, 2.1% in 1997, 2.5% in 1998 and 2.1% in 1999. The highest percentage on any day in the six-year period was only 4.5%, and in fact in no year after 1994 did the percentage on any day ever exceed 3.60%. (AmerenIP Ex. 2.8, p. 9.)

The Staff witness also argued that the delivery data for those delivery points on AmerenIP's system that are primarily used for storage injections should have made the metering

[33]In the other five years of the six-year period, the total metering error ranged from 1.0% to 1.3% of the total gas delivered to AmerenIP's city gate in the year. (AmerenIP Ex. 3.3, p. 9.)

[34]The average daily measurement errors for each year are based on AmerenIP's estimates, developed in 2003, of the amount of the injection meter over-registration in each year 1994-1999. These are the same estimates that Staff criticized in AmerenIP's gas rate case, Docket 04-0476, as inaccurate and unreliable. (Tr. 74-75.)

error more readily apparent. (Staff Ex. 4.00, p. 34.) His argument was premised on an incorrect assumption, because there are not a small number of delivery points on the AmerenIP system that are used primarily for receipt of gas for storage injections. Rather, gas delivered to virtually any AmerenIP delivery point on the Natural Gas Pipeline, Panhandle Eastern Pipe Line or Mississippi River Transmission Corporation pipeline systems can be moved to the Hillsboro Field for injection. (AmerenIP Ex. 2.8, p. 14.) Further, on a real-time basis AmerenIP does not nominate to individual stations, but rather on an aggregate basis for each pipeline. Therefore, AmerenIP would not be tracking nominations versus deliveries at individual gate stations, which would be necessary to detect the storage field metering error at individual stations or even in the aggregate at the stations that feed HSF, in the manner suggested by the Staff witness. (*Id*.)

In summary, the Staff witness's "gas tracking" issue, like his other "overall storage concerns", did not demonstrate that AmerenIP failed at any time to manage its storage fields in a safe, reliable and efficient manner.

IV. Conclusion

For the reasons detailed in this brief, the Commission should adopt AmerenIP's proposed reconciliation of gas costs and revenues collected under the PGA for the 2004 reconciliation year, as presented in AmerenIP Exhibit 1.1.

Respectfully submitted,

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