152 FERC ¶ 61,070
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Norman C. Bay, Chairman;
Philip D. Moeller, Cheryl A. LaFleur,
Tony Clark, and Colette D. Honorable.

Dominion Transmission, Inc. and Tennessee Gas Pipeline Company, L.L.C. — Docket No. CP14-549-000

ORDER ISSUING CERTIFICATE

(Issued July 24, 2015)

1. On September 5, 2014, Dominion Transmission, Inc. (Dominion) and Tennessee Gas Pipeline Company, L.L.C. (Tennessee) (collectively, Applicants) filed an application pursuant to section 7(c) of the Natural Gas Act (NGA) for a certificate of public convenience and necessity authorizing the Applicants to expand the active reservoir boundary of their jointly-owned Harrison Storage Pool (Harrison Pool) located in Pennsylvania and New York, and to establish a 2,000-foot-wide protective boundary, or buffer zone, around the expanded perimeter. For the reasons discussed below, and subject to the conditions herein, the Commission will deny the Applicants' proposal to expand the active reservoir boundary of the Harrison Pool. We will, however, issue a certificate authorizing the Applicants to establish a buffer zone consisting of the proposed active reservoir expansion area, as well as the proposed 2,000-foot-wide protective boundary around the perimeter of the Harrison Pool.

Background

2. Dominion, a corporation formed under the laws of Delaware, is a natural gas company, as defined by section 2(6) of the NGA.[1] Dominion transports and stores natural gas in interstate commerce in New York, Ohio, Pennsylvania, West Virginia, Virginia, Maryland, and the District of Columbia.

[1] 15 U.S.C. § 717a(6) (2012).

3. Tennessee, a limited liability company organized under the laws of Delaware, is a natural gas company, as defined by section 2(6) of the NGA. Tennessee stores and transports natural gas in interstate commerce in Texas, Louisiana, Arkansas, Mississippi, Alabama, Tennessee, Kentucky, West Virginia, Ohio, Pennsylvania, New York, New Jersey, Massachusetts, New Hampshire, Rhode Island, and Connecticut. Tennessee also has international border crossings into Mexico and Canada.

4. The Harrison Pool is located in Tioga and Potter Counties, Pennsylvania, and Steuben County, New York. Storage operations at the Harrison Pool were originally certificated in 1954.[2] Later in the same year, New York State Natural Gas Corporation, predecessor to Dominion, and Tennessee Gas Transmission Company, predecessor to Tennessee, were authorized to jointly own and develop the Harrison Pool.[3]

5. Natural gas at the Harrison Pool is stored in a depleted Oriskany Sandstone reservoir, which is overlain by both the Onondaga Limestone and the Marcellus Shale that serve as the geologic caprock. The Harrison Pool is approximately 2.5 miles wide and 8.5 miles long and has a total certificated capacity of 34.1 billion cubic feet (Bcf), composed of 13.3824 Bcf of cushion gas and 20.7176 Bcf of working gas.[4]

6. In 1985, Tennessee and the predecessor to Dominion filed a prior notice request pursuant to section 7 of the NGA proposing to increase the maximum certificated capacity of the Harrison Pool.[5] In that filing, the Applicants submitted a map (1985 Map)

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[2] *New York State Natural Gas Corp*., 13 FPC 1002 (1954) (Docket No. G-2143).

[3] *In re Iroquois Gas Corp*., 13 FPC 492, at 506-507, 516-517, and 518 Ordering Paragraph (B) (1954) (addressing consolidated dockets including relevant Docket No. G-2330).

[4] Application at 4. The total figure includes native gas. "Cushion gas" is defined as the quantity of gas that must be maintained as a permanent inventory in the storage reservoir to maintain deliverability at a given rate. Cushion gas is typically composed of both native gas (gas that has never been withdrawn from the ground) and base gas (gas that has already been produced and is injected into the storage reservoir during the development of the storage facility). "Working gas" is defined as the quantity of gas in the reservoir in excess of cushion gas. Working gas is available for withdrawal.

[5] *See* Tennessee Gas Pipeline Company and Consolidated Gas Transmission Corporation November 2, 1984 Filing in Docket No. CP85-85-000. Since there were no

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of the Harrison Pool depicting the reservoir's active limits, i.e., approximately 7,133.74 acres. The Applicants state that there has been no protective buffer zone requested or authorized since the original certificate was issued in 1954.

Description of Proposal

7. The Applicants request authorization to revise the active reservoir boundary of the Harrison Pool. The Applicants assert that recent geologic and engineering data indicate that the 7,133.74 acres depicted on the 1985 Map do not accurately reflect the area currently used for storage operations. Specifically, they state that their updated interpretation of the structural geology of the Oriskany Sandstone reservoir was digitized into a GeoGraphix Software project to calculate an active storage boundary of 8,450.76 acres. The additional 1,317.02 acres comprise two separate areas, one of 1,128.07 acres and one of 188.95 acres.[6]

8. The Applicants also seek authority to establish a 2,000-foot-wide, 5,895.36-acre protective buffer zone around the current and proposed Harrison Pool active reservoir boundary, stating that the proposed protective buffer zone is necessary to preserve the integrity of the Harrison Pool from third-party well completion activities. The Applicants state that they currently possess storage rights on approximately 81.3 percent of the proposed buffer acreage under the terms of existing storage leases.

9. The proposals, as well as the geologic and engineering data provided by the Applicants, are described in greater depth below.

10. The Applicants propose no new incremental service. They state that the purpose of the proposed project is to protect the security and integrity of the storage reservoir in order to improve the reliability of storage service for existing customers. The Applicants expect to incur additional costs in acquiring the property rights necessary for the proposed reservoir and protective boundaries. Therefore, the Applicants request a pre-determination that they may roll the costs associated with the project into their system rates in their next NGA section 4 rate proceedings.

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protests, the Prior Notice request was automatically authorized under each company's respective blanket certificate authority.

[6] In a data response filed February 18, 2015, the Applicants provided a map referring to the 1,128.07 acre expansion area as the Main Revised Area and the 188.95 acre expansion area as the Other Revised Area.

Notice, Interventions, and Protests

11. Notice of the application was published in the Federal Register on September 25, 2014.[7] The parties listed in the appendix filed timely, unopposed motions to intervene. Timely, unopposed motions to intervene are granted by operation of Rule 214 of the Commission's Rules of Practice and Procedure.[8]

12. Allegheny Defense Project (Allegheny) filed comments stating that Commission authorization of the Applicants' proposed expansion would facilitate further shale gas drilling in Pennsylvania and produce adverse effects to the state's air, land, and water, including detrimental effects to the Allegheny National Forest and Pennsylvania State forests, parks, and game lands. Allegheny further notes that storage gas migration resulting from nearby well completion practices could pose potential threats to water resources. Finally, Allegheny questions whether the Applicants' proposed protective buffer zone is large enough. We will address these comments where relevant below.

Discussion

13. Because the proposed extension will be used for the storage of natural gas in interstate commerce subject to the Commission's jurisdiction, the proposal is subject to the requirements of subsections (c) and (e) of section 7 of the NGA.[9]

Certificate Policy Statement

14. The Certificate Policy Statement provides guidance for evaluating proposals to certificate new construction.[10] The Certificate Policy Statement establishes criteria for determining whether there is a need for a proposed project and whether the proposed project will serve the public interest. The Certificate Policy Statement explains that in deciding whether to authorize the construction of major new natural gas facilities, the Commission balances the public benefits against the potential adverse consequences.

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[7] 79 Fed. Reg. 57,544 (2014).

[8] 18 C.F.R. § 385.214(a)(3) (2014).

[9] 15 U.S.C. §§ 717(b), 717f(c), (e) (2012).

[10] *Certification of New Interstate Natural Gas Pipeline Facilities*, 88 FERC ¶ 61,227 (1999), *clarified*, 90 FERC ¶ 61,128, *further clarified*, 92 FERC ¶ 61,094 (2000) (Certificate Policy Statement).

The Commission's goal is to give appropriate consideration to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicant's responsibility for unsubscribed capacity, the avoidance of unnecessary disruptions of the environment, and the unneeded exercise of eminent domain.

15. Under this policy, the threshold requirement for applicants proposing new projects is that the applicant must be prepared to financially support the project without relying on subsidization from its existing customers. The next step is to determine whether the applicant has made efforts to eliminate or minimize any adverse effects the project might have on the applicant's existing customers, existing pipelines in the market and their captive customers, or landowners and communities affected by the construction of the new natural gas facilities. If residual adverse effects on these interest groups are identified after efforts have been made to minimize them, the Commission will evaluate the project by balancing the evidence of public benefits to be achieved against the residual adverse effects. This is essentially an economic test. Only when the benefits outweigh the adverse effects on economic interests will the Commission proceed to complete the environmental analysis where other interests are considered.

16. As noted above, the threshold requirement for applicants proposing new projects is that the applicant must be prepared to financially support the project without relying on subsidization from its existing customers. However, the Certificate Policy Statement provides that it is not a subsidy for existing customers to pay for projects designed to improve existing service or the reliability of that service. The costs of such projects are permitted to be rolled into system-wide rates.[11]

17. The Applicants did not include any cost information in their filing, since they are not proposing to construct new facilities. However, the Applicants state that they expect to incur expenses to acquire the property rights necessary for their proposals.

18. The Applicants have not proposed to extend the boundaries of the storage pool in order to increase storage operations. Further, under the circumstances here, we do not need to know the level of costs in order to determine whether the costs are eligible for rolled-in rate treatment. Since the purpose of this project is solely to preserve the reliability of existing customers' storage service and not to add new services or increase the facility's capacity or deliverability, we find that it is appropriate to allow the Applicants to roll their costs into their system-wide rates in a future rate case, absent a significant change in circumstances. However, the Applicants' customers will have the

[11] Certificate Policy Statement, 88 FERC ¶ 61,227 at 61,747 n.12.

opportunity to examine the prudence of the level of costs the Applicants seek to recover through their rates in that future rate proceeding. Thus, the Applicants should keep separate, detailed records of all of the costs associated with the Harrison Pool expansion.

19. The buffer zone expansion approved below will not impact the certificated operational parameters of the storage field, nor will it degrade any existing service provided by the Applicants. Thus, the protective buffer zone expansion will not have an adverse impact on existing customers or their services. Further, since the Applicants propose no additional facilities or incremental services, the proposal will have no adverse impact on other pipelines or their captive customers. Also, no pipeline or their customers protested the application.

20. The Applicants do not propose to construct any facilities. In addition, of the total 8,450.76 acres within the existing and proposed active reservoir boundary, the Applicants hold storage leases for 7,956.54 acres (94.15 percent). Further, of the total 5,895.36 acres within the proposed 2,000-foot buffer zone, the Applicants hold storage leases for 4,793.88 acres (81.32 percent). The Applicants state that they will work with landowners to acquire storage agreements on the remaining acreage. No landowner commented on or protested the Applicants' proposal. Thus, we find that the Applicants' have minimized impacts on landowners and surrounding communities.

21. Allegheny states that storage gas migration resulting from nearby well completion practices could pose threats to water resources, thus potentially impacting landowners and communities. Allegheny also states that the Applicants' proposal will facilitate further shale gas drilling in Pennsylvania, causing detrimental environmental effects. Finally, Allegheny questions whether the Applicants' proposed protective buffer zone is large enough.

22. The Applicants' proposal is intended to prevent impacts to the integrity of the existing Harrison Pool, potential gas migration from the storage facility among them. We find below that a protective buffer zone will adequately accomplish this purpose. A protective buffer zone will reduce potential threats to nearby water resources by increasing the acreage that is protected from potential development by third-party producers. The Applicants do not request additional storage capacity. Accordingly, we find no need to further address Allegheny's concerns. Based on information about the horizontal reach of production activities and our precedent,[12] we find that the

[12] *Dominion Transmission, Inc.*, 137 FERC ¶ 61,132 (2011) (authorizing a 2,000-foot protective buffer).

7,212.38-acre buffer zone approved in this order will adequately protect Applicants' storage assets.

23. As discussed below, we find that permitting the Applicants to establish a protective buffer zone around the Harrison Pool will enable them to better limit activities that could compromise the caprock and impact the storage reservoir, thereby ensuring that the Applicants can continue to use the Harrison Pool as previously authorized. The Applicants have a responsibility to protect the natural gas that their customers have entrusted to them to store in the Harrison Pool and a responsibility to maintain the integrity of the storage reservoir.

24. Based on the project's benefits and its lack of identifiable adverse impacts on the Applicants' existing customers or other pipelines and their customers, and its minimal impacts on landowners and communities, we find, consistent with the Certificate Policy Statement and section 7(c) of the NGA, that the Applicants' proposal, as conditioned below, is required by the public convenience and necessity.

Analysis of Proposal

Background

25. The Harrison Pool is located within the northern Appalachian producing province, which is composed of alternating, gently dipping anticlines and synclines[13] aligned on the northeast-southwest axis of the Appalachian Basin.[14] Faults associated with the anticlinal structures are typically aligned on the same axis, and local structural doming is commonly present on the anticlines.[15]

26. Gas at the Harrison Pool is stored in the Devonian-aged Oriskany Sandstone, which has an average thickness of 24 feet and an average net pay porosity[16] of

[13] Anticlines and synclines are folded rock strata. Anticlines are typified by upfolded strata, while synclines are typified by the downfolded "trough" strata.

[14] Application, Ex. H at 3.

[15] *Id*.

[16] Net pay zone is an oil and gas industry term used to denote the part of a reservoir that contains recoverable hydrocarbons. Net pay porosity and net pay thickness would represent the corresponding values for these reservoir characteristics of the net pay

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9.65 percent.[17] Stratigraphically positioned above the Oriskany Sandstone overlies the approximately 30-foot-thick Onondaga Limestone, which is itself overlain by the approximately 90-foot-thick Marcellus Shale.[18] A structural high, the Harrison Dome, typifies the approximate western two thirds of the Harrison Pool.[19] The Applicants state that a northeast-southwest trending fault bisects the west-northwest portion of the Harrison Pool, but is of insufficient magnitude to cause geologic separation within the pool.[20] The Applicants state that within the domal structure, the Oriskany Sandstone exhibits a structural closure of approximately 150 feet as determined from the original salt water limit occurring at -2,975 feet to the domal crest at -2,825 feet.[21]

27. The approximate eastern third of the existing Harrison Pool consists of the Northeast Lobe, a structural extension of the Oriskany Sandstone, which is bound to the south-southeast by a confining fault. A structural low on the downthrow side of the fault separates the Northeast Lobe from a parallel lobe farther south, which the Applicants identify as a structural extension of the Oriskany Sandstone as well. They refer to this area as the Main Revised Area. The Northeast Lobe and Main Revised Area extend northeast from the primary storage region in the Harrison Dome, but a structural low separates them into parallel rabbit ears.

28. A fault provides confinement along the entire southeast boundary of the existing Harrison Dome and extending to the Main Revised Area.[22] The original salt water limit

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zone. With respect to the Harrison Storage Pool, the net pay porosity would represent the porosity of the Oriskany Sandstone in which gas is stored.

[17] Application, Ex. H at 4.

[18] Application, Ex. H at 2, 6.

[19] Application, Ex. H at 5. The Applicants refer to the domal structure as the Harrison Dome.

[20] Application, Ex. H at 4.

[21] Application, Ex. H at 5.

[22] Application, Ex. H at 7; February 18 Response to Data Request, Attachment to Question 1a (February 18 Response Map).

exists at -2,975 feet, confining the reservoir; additional confinement is provided by either tight sand or structural closure.[23]

29. The Applicants state that when the Harrison Pool was originally certificated, the storage field was understood to consist of two separate pools, Harrison-West End and Harrison-East End. The data available at that time indicated a fault separating the two Harrison pools from the adjacent Brookfield Pool in the Main Revised Area.[24] The Applicants state that recently-evaluated geologic data indicates that the supposed fault does not exist but rather indicates a structural extension of the Oriskany Sandstone beyond the Harrison Pool to include the Brookfield Pool. The Applicants further state that the data shows that the active boundary is defined by a structural high trending along the main southeast fault plane in a northeast direction toward wells in the eastern portion of the Brookfield Pool numbered N-62 and N-217.[25] The Applicants aver that after production from well N-62 ceased and the well was shut in for a period of time, the pressure data recorded from well N-62 indicated hydraulic connectivity between the two-pool storage operation (i.e., Harrison-West End and Harrison-East End) and the Main Revised Area.[26] Thus, the Applicants assert, storage gas could migrate from the existing storage reservoir into the Main Revised Area.

30. The Applicants contend that due to the lack of the fault and due to the current structural interpretation indicating the extension of the Oriskany Sandstone, the active limits of the Harrison Pool in fact include the Brookfield Pool. Accordingly, the Applicants propose to increase the active reservoir boundary by the 1,128.07 acres of the Main Revised Area.

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[23] Application, Ex. H at 5.

[24] The Brookfield Pool is an Oriskany sandstone production pool with two plugged and abandoned wells, N-62 and N-217. Production well N-62 and several leases for the Brookfield Pool were owned and operated by Dominion's predecessor, the New York State Natural Gas Corporation. Application at 7.

[25] The Applicants note that porosity is lower in this area than in the primary acreage of the Harrison Pool.

[26] In a data response filed January 28, 2015, the Applicants provided data in response to the Commission's Question 2, indicating that the structural extension referred to as "Main Revised Area" comprises 1,128.07 acres.

31. The Applicants also propose to expand the active reservoir boundary along the Harrison Pool's Northeast Lobe. The Applicants state that the expansion represents the most recent interpretation of the original gas bubble/salt water limit of -2,975 feet.[27] Accordingly, the Applicants propose to expand the active reservoir boundary along the eastern edge of the Northeast Lobe by 188.95 acres.[28] We will refer to this area along the Northeast Lobe as the Other Revised Area.

32. The Applicants state that the Marcellus Shale caprock is stratigraphically situated 30 feet above the Oriskany Sandstone.[29] The Applicants assert that if a third party were to fracture-treat the Marcellus Shale near the Brookfield Pool, the fracture could propagate into the Oriskany Sandstone formation interval and create a vertical migration pathway to allow potential upward migration of storage gas into shallower geologic strata. The Applicants assert that increasing the active boundary of the reservoir to include the Brookfield Pool would protect the Harrison Pool from storage gas migration.[30]

33. Finally, the Applicants propose a 2,000-foot-wide protective buffer zone comprising 5,895.36 acres around the perimeter of the expanded active reservoir boundary to ensure the integrity of the Harrison Pool from all directions.

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[27] February 18, 2015 Response to Data Request, Response to Question 1.c with accompanying map titled "Harrison Storage Pool Oriskany Structure." (February 18 Response Map).

[28] The expansion of the active reservoir boundary by 1,128.07 acres in the Main Revised Area and by 188.95 acres in the Other Revised Area would increase the total size of the active storage reservoir boundary from 7,133.74 acres to 8,450.76 acres.

[29] The approximately 30-foot-thick Onondaga Limestone lies above the Oriskany Sandstone and below the Marcellus Shale. The Applicants assert that both the Onondaga Limestone and Marcellus Shale are recognized as the geologic caprock for the Oriskany Sandstone in the Appalachian Basin. Application at 9.

[30] Application at 8.

Analysis

1. Caprock Designation

34. The Applicants assert that the combination of the 30-foot-thick Onondaga Limestone that overlies the Oriskany Sandstone and the impermeable Marcellus Shale that overlies the Onondaga Limestone together serve as the geologic caprock for the Oriskany Sandstone reservoir at the Harrison Pool. The Applicants state that no caprock information concerning the facility has ever been provided to the Commission.[31]

35. The Commission authorizes caprock and other geologic and engineering characteristics of storage facilities on a case-by-case basis in conjunction with its certificate authorization.[32] The Applicants assert that (1) within the Appalachian Basin, the combination of the Marcellus Shale and Onondaga Limestone serve as the caprock for gas trapped in the Oriskany Sandstone;[33] (2) horizontally drilled Marcellus Shale wells located near the Harrison Pool could compromise the integrity of the caprock due to the potential for hydraulic fracture treatments to vertically propagate into the Oriskany Sandstone below;[34] and (3) as a result, a communication pathway could be developed between the Marcellus and the Oriskany formations over time such that storage gas containment could be compromised.[35]

36. In this proceeding, the Applicants state for the first time that the approximate 30-foot-thick Onondaga Limestone and the approximate 90-foot-thick Marcellus Shale serve as the caprock for the Oriskany Sandstone at the Harrison Pool. Additionally, the Applicants state that the proposed 2,000-foot buffer will protect against the likelihood of

[31] *See* November 19, 2014 Response to Data Request (November 2014 Response).

[32] *See, e.g.*, *Blue Sky Gas Storage, LLC*, 129 FERC ¶ 61,210, at P 49 (2009) ("[S]taff has determined that the caprock for the Blue Sky project is the Upper D Shale and D-1 Sandstone."). Applications for certificates of public convenience and necessity for underground storage facilities must include "a description of the current geological interpretation of the storage reservoir, including both the storage formation and the caprock." 18 C.F.R. § 157.213(c)(1) (2014).

[33] Application at 9.

[34] Application, Ex. H at 2, 7.

[35] Application, Ex. H at 2-3.

potential adverse impacts to the Oriskany Sandstone from third-party shale gas producers in the vicinity. In support of this statement, the Applicants provided the February 18 Response Map, which shows Marcellus Shale well completions encroaching to within approximately 2,000 feet of the Main Revised Area.[36]

37. Since the Onondaga Limestone and Marcellus Shale caprock serve to protect the integrity of the Harrison Pool, we will include the caprock identified by the Applicants as part of the certificate authorization for the establishment of a protective buffer zone at the Harrison Pool.[37]

2. Active Reservoir Boundary

38. The Applicants request authority to increase the size of the active storage reservoir boundary from 7,133.74 acres to 8,450.76 acres, as determined by their recent structural geology and engineering analysis of the Harrison Pool. Because the actual boundaries of an underground reservoir depend on characteristics that can generally be confirmed only after the facility has commenced operation, it is not unusual to find that the underground reservoir does not confine gas volumes as anticipated. In such cases, to ensure the integrity of the storage reservoir and the efficient operation of the storage facility, the Commission typically either revises a storage facility's certificated boundaries to conform to the enlarged contours of the actual underground reservoir[38] or alters the operating parameters of the storage facility to prevent gas from migrating beyond the facility's certificated boundaries.[39]

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[36] February 18 Response Map.

[37] *See, e.g., Natural Gas Pipeline Co. of America,* 113 FERC ¶ 62,011 (2005) (finding that the bottom 200 feet of the Wellington formation provides the caprock of the Sayre Storage Field and should be specifically included within the company's certificate authorization to acquire, develop, and operate the field)**.**

[38] *See, e.g., Williston Basin Interstate Pipeline Co.,* 127 FERC ¶ 61,045 (2009); *Dominion Transmission, Inc.,* 100 FERC ¶ 61,168 (2002); *Williams Natural Gas Pipelines Central, Inc.,* 83 FERC ¶ 61,120 (1998); *Williams Natural Gas Co.,* 77 FERC ¶ 61,150 (1996); *ANR Pipeline Co.,* 76 FERC ¶ 61,263 (1996), *reh'g denied,* 78 FERC ¶ 61,122 (1997); and *Columbia Gas Transmission Corp.,* 35 FERC ¶ 61,345 (1986).

[39] *See, e.g., Equitrans, L.P.,* 119 FERC ¶ 61,287 (2007), in which the Commission set maximum inventory and pressure parameters at levels to ensure the integrity of storage reservoirs and to minimize gas migration.

39. Regarding the former, the Commission grants jurisdictional storage field operators certificate authority to revise storage field boundaries when the company can demonstrate with engineering and geologic data that such authorization is required by the public convenience and necessity in order to improve the operation of the storage field or to maintain its integrity.[40] In deciding whether the public convenience and necessity requires approval of a company's request to enlarge its storage boundary due to gas migration problems, a material consideration is whether the storage reservoir has expanded and whether the company's estimations of the reservoir and protective boundaries are reasonable.[41]

40. The Applicants state that recent geologic and engineering analysis indicates that the fault originally thought to separate the Harrison and Brookfield Pools does not exist, but rather indicates a structural extension of the Oriskany Sandstone from the Harrison Pool into the proposed Main Revised Area.

41. Brookfield Pool wells N-62 and N-217 are located near the northeast limit of the Main Revised Area. As previously discussed, the Applicants aver that after production from well N-62 ceased and the well was shut in for a period of time, pressure data from well N-62 indicated hydraulic connectivity between storage operations and the Main Revised Area. The Applicants assert that despite relatively low porosity in the Oriskany Sandstone in the Main Revised Area, gas could migrate from the existing Harrison Pool in a northeastern direction toward well N-62. The Applicants posit that should the Marcellus Shale be fracture-treated in the area of well N-62, a vertical migration pathway could be created to allow for storage gas to migrate upward into shallower geologic zones. The Applicants state that increasing the active reservoir boundary of the Harrison Storage Pool to include the Main Revised Area, which itself includes the Brookfield Pool, would protect against storage gas migration.

42. Commission staff's analysis of the data confirms the Applicants' recent geologic interpretation, finding that no fault separates the Harrison Dome from the Brookfield Pool. Rather, a structural extension of the Oriskany Sandstone reaches into the Main Revised Area, which includes the Brookfield Pool. The Applicants' updated structural

[40] *See Northern Natural Gas Co.*, 131 FERC ¶ 61,209 (2010); *Columbia Gas Transmission Corp.*, 128 FERC ¶ 61,050 (2009); and *Williston Basin Interstate Pipeline Co.*, 127 FERC ¶ 61,045 (2009).

[41] *ANR Pipeline Co.*, 76 FERC ¶ 61,263, at 62,346 (1996).

interpretation of the Oriskany Sandstone in the Main Revised Area was digitized and calculated to comprise 1,128.07 acres.

43. As previously detailed, the Applicants believe that the Harrison Storage Pool is hydraulically connected to the Brookfield Pool. However, in the November 2014 Response, the Applicants were asked if a feasibility study had been conducted to determine what operational activities could prevent storage gas migration and/or recover storage gas that is currently present in the proposed expansion area that includes well N-62. The Applicants responded that a feasibility study had not been conducted because "storage field data does not indicate that there is storage gas to be recovered" and added that "adjustments to booked inventories has been insignificant."[42]

44. In addition, the Applicants' February 18 Response Map depicts the Brookfield Pool wells N-62 and N-217 as "Plugged and Abandoned."[43] It also depicts well HW-58, located within the Main Revised Area approximately 1,000 feet outside and east of the existing active reservoir boundary, as "Water Saturated [Plugged and Abandoned]." The February 18 Response Map also depicts well 105-00835, located approximately 1,000 feet northeast of the existing southeast boundary of the Harrison Pool, as "Gas [Plugged and Abandoned]." There are no active production wells or other Plugged and Abandoned wells located in the Main Revised Area.

45. The Applicants' April 17, 2015 Data Response (April 17 Response) provides further insight as to why there may not be storage gas to be recovered from the Main Revised Area. Specifically, the Applicants state that the net isopach and the net pay porosity map indicate that the Oriskany Sandstone appears to be better developed throughout the higher structural areas of the Harrison Dome and becomes "tighter" down-dip along the flanks,[44] and that this reservoir characteristic is evidenced by the presence of poorer producing wells further down structure.[45] Both the Northeast Lobe and the Main Revised Area are down structure of the Harrison Dome. Well HW-58, which lies down structure between the Harrison Dome and the Brookfield Pool, is identified as "Water Saturated; Plugged and Abandoned" The April 17 Response provides various

[42] November 2014 Response, Question 5.

[43] February 18 Response Map.

[44] Application, Exhibit H at 5.

[45] The Oriskany Sandstone is of lower porosity between wells HW-40 and N-62. Application at 8.

well completion and abandonment reports for wells HW-58[46] and N-217[47] in the Main Revised Area. Excerpts regarding well HW-58 stated the Oriskany net pay thickness was one foot and exhibited a porosity of one percent. Additional filed information indicates that well HW-58 was salt water saturated and "was a poor well from the start."[48] The April 17 Response further indicates that well N-217, located approximately 2,500 feet northwest of well N-62, exhibited only modestly better porosity and Oriskany net pay thickness than well HW-58, but ultimately was plugged and abandoned.

46. The fact that records exist for only four wells in the Main Revised Area dating back to at least 1939 indicates that the Oriskany Sandstone in this area exhibits poor reservoir characteristics. In their April 17 Response, the Applicants provide further insight into reservoir quality in the Main Revised Area, stating that:

> Most of the production wells for which [Dominion] is providing requested information were plugged and abandoned shortly after drilling due to excessively high water production and very low gas production. [Dominion] believes this mechanism to still be in place since there have been no production or storage wells drilled in subsequent years in this area.[49]

47. The Applicants state only that despite the lower porosity in the Main Revised Area, storage gas *could* slowly migrate within the Oriskany structure.[50] However, the Applicants have provided no definitive data demonstrating that storage gas is currently migrating from the existing Harrison Pool, stating that, "storage field data does not indicate that there is storage gas to be recovered."[51] Furthermore, the record suggests that within the Main Revised Area, the Oriskany Sandstone exhibits poor reservoir

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[46] Well HW-58 was completed and abandoned on January 15, 1957.

[47] Well N-217 was completed in 1939.

[48] April 17 Response, Attach. to Question 1.b.

[49] April 17 Response No. 1.c., for which the Applicants supplied data for wells N-217 and NW-58 in the Main Revised Area and wells HW-24 in the currently certificated Northeast Lobe and HW-23 in the Other Revised Area.

[50] Application at 8.

[51] November 2014 Response No. 5.

characteristics. Thus, the Applicants' assertions indicating that storage gas has migrated beyond its existing certificated active reservoir boundary and into the Main Revised Area are speculative at best. Accordingly, we do not find that the public convenience and necessity requires certification of the Main Revised Area as active reservoir acreage.

48. Nevertheless, we are concerned about the potential impacts to the Harrison Pool from nearby well completion activities in the Marcellus Shale, which also serves as caprock for the storage field. The February 18 Response Map depicts Marcellus well completions approximately 2,000 feet from the Main Revised Area. Currently, there are no impediments to producers completing wells in the Marcellus Shale within the proposed 1,128.07-foot expansion area that could propagate into the active reservoir.

49. Accordingly, in order to protect the integrity of the storage reservoir from potential Marcellus Shale drilling and completion practices, we will authorize the approximately 1,128.07 acres of the Main Revised Area as a protective buffer zone.[52] We will prohibit the Applicants from injecting gas into or withdrawing gas from the Main Revised Area buffer acreage at any time. Within one year of the date of this order, the Applicants must provide a plan to monitor pressure and determine gas geochemistry in the Oriskany Sandstone within the 1,128.07-acre Main Revised Area.

50. In regard to the Other Revised Area, the Applicants' proposal suffers from a similar lack of evidence. The approximate 189 acres that comprise the proposed Other Revised Area reservoir expansion are located at the northeast tip of the Northeast Lobe. There are no injection-withdrawal wells completed in the Northeast Lobe, with nearly all of the injection-withdrawal wells at the Harrison Pool being located on the domal structure in the western two thirds of the reservoir. Well HW-23, identified as "Shallow Production Inactive" in the April 17 Response, is located within the Other Revised Area.[53] Additionally, well HW-24, located approximately 5,000 feet northeast of well

[52] Applicants state in April 17 Response No. 3 that if the Commission determines that the existing active boundary of the storage pool should not change, they believe "at a minimum, this portion would need to be included as part of the protective boundary (in addition to the proposed 2,000-foot buffer zone)."

[53] April 17 Response No. 2 states that HW-23 was originally completed in 1938 as an Oriskany production well that was plugged after seven months. In 1955, it was reentered and reworked for storage but was "drowned out by [salt water]." In 1972, the well was completed in shallower formations and provided free gas to a customer. HW-23 was recently disconnected and reclassified as an inactive shallow production well.

HW-11[54] in the Northeast Lobe, is identified as "Water Saturated; [Plugged and Abandoned]" on the February 18 Response Map. Finally, well HW-25, located approximately 1,500 feet southwest of the northeast tip of the existing active reservoir boundary, is identified as "Gas Well; [Plugged and Abandoned]" on the February 18 Response Map.[55] Much like the Main Revised Area, the Northeast Lobe is characterized by relatively thin net pay Oriskany Sandstone and low porosity.[56]

51. The Applicants state that the Other Revised Area represents the most recent interpretation of the original gas bubble/salt water limit of -2,975 feet.[57] There is likely little natural gas stored in the Northeast Lobe as indicated by the plugged and abandoned, water-saturated well HW-24, which was completed in approximately two-foot-thick Oriskany Sandstone of low porosity. Additionally, the Applicants state that most of the production wells in the Northeast Lobe were plugged and abandoned shortly after drilling due to excessively high water production and low gas production. Further, the Applicants state that they believe this mechanism is still in place since there have been no production or storage wells drilled in subsequent years in this area.[58]

52. Under the circumstances presented here, Applicants have not demonstrated that storage gas has migrated beyond the currently certificated active reservoir boundary into the Other Revised Area. Thus, we do not find that the public convenience and necessity requires certification of the Other Revised Area as active reservoir acreage. However, consistent with our authorization of the Main Revised Area as certificated buffer acreage, in order to protect the integrity of the storage reservoir as defined by the revised -2,975 foot contour, we will authorize the approximately 189-acre Other Revised Area as certificated buffer acreage. We will require that at no time may the Applicants inject gas into or withdraw gas from the approximate 189-acre Other Revised Area. We

[54] The February 18 Response Map depicts HW-11 as the most northeast located injection/withdrawal well within the existing certificated reservoir.

[55] The Applicants' February 18 Response to Data Request, Response to Question 1.a, attached map of "Harrison Storage Pool – Oriskany Structure."

[56] Data provided in the April 17 Response No. 1.b indicates well HW-24 has an estimated Oriskany net pay of two feet and a net pay porosity of four percent. Response No. 2 indicates an Oriskany net pay of three feet for well HW-23.

[57] February 18 Response No. 1.c and February 18 Map.

[58] April 17 Response No. 1.c.

will also require the Applicants to file with the Commission, no later than one year after issuance of this order, a report on the status and the final disposition of well HW-23.

3. 2,000-Foot-Wide Protective Buffer Zone

53. The Applicants request authorization to establish a 2,000-foot-wide protective buffer zone comprising 5,895.36 acres around the perimeter of both the existing 7,133.74-acre active storage reservoir and the proposed 1,317.02-acre expansion. The Applicants do not currently have a protective buffer zone of any size around the Harrison Pool, but seek to establish the buffer to limit drilling and well completion activities in the Marcellus Shale that may jeopardize the sealing/trapping mechanisms in place for the Harrison Pool.

54. In *Dominion Transmission, Inc. (Dominion),*[59] we authorized a 2,000-foot protective buffer at Dominion's Woodhull Storage Pool in a geologic setting similar to here where a protective buffer had not been previously established.[60] In that case, we found that a buffer zone is important to protect the integrity of the storage field, especially in areas where intensive natural gas production activities are possible.

55. Here, as in the *Dominion* case, the Applicants have demonstrated that well completions have encroached to within approximately 2,000 feet of the Main Revised Area. Thus, we find that the Applicants have demonstrated that their request for a certificated 2,000-foot protective buffer around the active storage reservoir, Main Revised Area, and Other Revised Area to maintain the integrity of the Oriskany Sandstone and the overlying caprock is required by the public convenience and necessity.

Environmental

56. The Commission reviewed the Applicants' proposal and determined that the environment is not involved, and thus, no National Environmental Policy Act analysis was conducted.

57. The Commission, on its own motion, received and made a part of the record in this proceeding all evidence, including the application(s) as supplemented, and exhibits

[59] *Dominion* 137 FERC ¶ 61,132.

[60] The Woodhull Storage Pool, as with the Harrison Pool, is located in the northern Appalachian producing area that is characterized by alternating, gently dipping anticlines and synclines aligned on a northeast-southwest axis.

thereto, submitted in support of the authorizations sought herein, and upon consideration of the record,

The Commission orders:

(A) The Applicants' proposal to expand the active reservoir boundary of the Harrison Pool by the 1,128.07-acre Main Revised Area and the 188.95-acre Other Revised Area is denied.

(B) A certificate of public convenience and necessity is issued to the Applicants authorizing the 1,128.07-acre Main Revised Area and the 188.95-acre Other Revised Area as a certificated protective buffer zone to include the Onondaga Limestone and Marcellus Shale caprock, all as described in the body of this order.

Our certificate authority further authorizes establishment of a 2,000-foot certificated protective buffer zone comprising 5,895.36 acres extending radially from the existing reservoir boundary, the Other Revised Area and the Main Revised Area, to include the Oriskany Sandstone storage formation and the Onondaga Limestone and Marcellus Shale caprock, all as described in the body of this order.

(C) The certificate issued in Ordering Paragraphs (A) and (B) is conditioned on the Applicants:

(1) not injecting or withdrawing gas for storage into the Harrison Storage Pool's 7,212.38 acre buffer zone;

(2) complying with all regulations under the NGA including, but not limited to, paragraphs (a), (c), (e) and (f) of section 157.20 of the Commission's regulations;

(3) filing with the Commission:

a) within one year of the date of this Order, a plan to monitor pressure and determine gas geochemistry in the Oriskany Sandstone within the 1,128.07 acre Main Revised Area; and

b) within one year of the date of this Order, a report on the status and the intended final disposition of well HW-23.

(D) The Applicants' request for a predetermination that they may rolled the costs associated with the project into their system rates in their next NGA section 4 rate proceeding is granted, absent a significant change in circumstances.

(E) The Applicants may not change the certificated injection or withdrawal capability or certificated capacity of the Harrison Pool without prior Commission authorization.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

APPENDIX

Timely motions to intervene in this proceeding were filed by:

- Allegheny Defense Project
- Atmos Energy Corporation
- Atmos Energy Marketing LLC
- Atlanta Gas Light Company, jointly with
  Chattanooga Gas Company
  Northern Illinois Gas Company d/b/a Nicor Gas Company in Illinois
  Pivotal Utility Holdings, Inc. d/b/a Elizabethtown Gas in New Jersey
  Virginia Natural Gas, Incorporated
- Consolidated Edison Company of New York, Incorporated, jointly with
  Philadelphia Gas Works
  Orange and Rockland Utilities, Incorporated
- National Grid Gas Delivery Companies
- New Jersey Natural Gas Company
- New York State Department of Environmental Conservation
- NJR Energy Services Company
- PSEG Energy Resources & Trade LLC
- Washington Gas Light Company