



COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL HEARING BOARD



LOREN KISKADDEN	:	
	:	
v.	:	EHB Docket No. 2011-149-R
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COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION and RANGE RESOURCES - APPALACHIA, LLC, Permittee	:	Issued: June 12, 2015
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ADJUDICATION

By Thomas W. Renwand, Chief Judge and Chairman

Synopsis

The Pennsylvania Environmental Hearing Board finds that the Appellant has not met his burden of proving by a preponderance of the evidence that his water well was impacted by gas drilling operations conducted by Range Resources. Although the Appellant presented extensive evidence of leaks and spills that occurred at Range’s site, some of which were not reported to the Department of Environmental Protection in a timely manner, he did not demonstrate by a preponderance of the evidence that a hydrogeological connection exists between his water well and the Range site. It is not enough for the Appellant to simply show that the Department was not aware of all the leaks or spills or that the Department had not reviewed all of the sampling data when it made its determination. Because the Board’s review is *de novo*, we consider the case anew and may examine evidence that was not available to the Department when it made its decision.

Background

This matter involves an appeal filed by Mr. Loren Kiskadden (Mr. Kiskadden or the Appellant), challenging a determination by the Pennsylvania Department of Environmental Protection (Department) that natural gas drilling activities conducted by Range Resources-Appalachia, LLC (Range) at its Yeager site in Washington County did not pollute Mr. Kiskadden's water supply. Mr. Kiskadden lives along Banetown Road in Amwell Township, Washington County, Pennsylvania. His water supply is a well that is situated on his property. Mr. Kiskadden does not know the age or details regarding the construction of the well, but believes it is anywhere from 300 to 397 feet in depth. His property is adjacent to a vehicle scrap yard which was run by his family since at least the 1960s.

Mr. Kiskadden's well is approximately one half mile from Range's Yeager site.¹ The Yeager site is located on a hilltop to the northeast of Mr. Kiskadden's property which sits in a valley. At the time of Mr. Kiskadden's appeal, Range was operating one unconventional gas well at the Yeager site, the 7H well, which was drilled from September to November 2009 and hydraulically fractured in December 2009. The 7H well produces gas from the Burkett Shale within the Upper Devonian Formation at a depth of approximately 7,200 feet. Two additional wells were added at a later date, the 1H and 2H gas wells, which were drilled vertically from approximately December 2010 to January 2011 and drilled horizontally and hydraulically fractured in 2014. The 1H and 2H wells' target formation is the Marcellus Shale. At the time period relevant to this appeal, the Yeager site also consisted of an impoundment and a drill cuttings pit that was in the process of being reclaimed.

¹ Range Ex. 222, a map of the Yeager site and the surrounding area, is attached as an appendix to this Adjudication.

It is clear from evidence presented by Mr. Kiskadden at trial that problems existed at the Yeager site. A number of leaks and spills occurred there, in particular during the timeframe from 2010 through 2011.² At least some of the leaks and spills were never reported to the Department or were not reported in a timely or accurate manner. A summary of the leaks and spills that occurred at the Yeager site during 2010 and 2011 include, but are not necessarily limited to, the following: A Department inspection of the drill cuttings pit on March 25, 2010 revealed that the drill cuttings pit had leaked, releasing production fluids into the soil. (F.F. 36)³ Because the drill cuttings pit did not have a leak detection system, the only way to determine if it was leaking was after the leak had escaped the contained area. (T. 454-55) On April 12, 2010, fluid was placed in the Yeager impoundment before a hole in the double liner system had been patched. (F.F. 45) On June 18, 2010, ten gallons of drilling mud were spilled onto the ground at the Yeager site. (F.F. 46) On July 14, 2010, a secondary containment overflowed and flowback water was released to the ground. The Department was unaware of how much fluid was released. (F.F. 47) In August 2010, hydrogen sulfide was detected and treated in the Yeager impoundment. (F.F. 48) On August 18, 2010, a spill of brine water occurred at the Yeager site. The amount was approximately one to two barrels, with 42 gallons in a barrel. (F.F. 49) On August 24, 2010, “a couple hundred gallons” of clarified brine spilled from a tank outside the containment area on the Yeager site. (F.F. 50) Also in August 2010, holes were discovered in the containment system, which allowed spilled fluids to leak into the ground. (F.F. 51) On November 10 and 19, 2010, testing of the impoundment’s leak detection zone revealed that the impoundment was leaking. (F.F. 52) Sampling data that would have indicated a leak was occurring was not revealed to the Department at the time of its discovery. (F.F. 53) Based on the design of the leak detection

² The Appellant’s post hearing brief includes a concise and thorough summary of the leaks and spills that occurred during this time period. (Appellant’s Post Hearing Brief, p. 193-197)

³ “F.F.” refers to a Finding of Fact set forth later in this Adjudication.

system, a leak from the impoundment would not be discovered until it had made contact with the ground. (F.F. 54)⁴

On December 7, 2010, the secondary containment at the Yeager impoundment overflowed. (F.F. 56) On the same day, December 7, 2010, 15 gallons of diesel fuel spilled in the same area. (F.F. 56) On January 3, 2011, 10-15 barrels of blended water were released onto the ground at the Yeager site; blended water consists of flowback, frac water or treated water. (F.F. 57) On January 26, 2011, a leak occurred on a transfer line that was transferring flowback water between the Yeager site and another drill site. (F.F. 58) On February 8, 2011, a truck overturned at the Yeager site, spilling a load of frac water, diesel fuel and oil. (F.F. 59) On March 10, 2011, a truck left its valve open and fluid spilled onto the ground at the Yeager site. The spill ran down the access road and into a field owned by Ron and Sharon Yeager. (F.F. 60) The amount of fluid was reported by Range to be 20-25 gallons, but the driver believed it to be approximately 100 gallons. (F.F. 60, 61) On June 2, 2011, a truck left its valve open at the Yeager site and spilled recycled water that had been removed from the Yeager impoundment. (F.F. 62)

On or about June 3, 2011, Mr. Kiskadden contends that, while filling a child's sized swimming pool, his water began foaming, contained gray sludge and had a rotten egg odor. Mr. Kiskadden filed a complaint with the Department, and the Department conducted an investigation that consisted of visits to the site and water quality testing.⁵ On September 9, 2011

⁴Testing of the impoundment's leak detection zone on August 15, 2011, September 27, 2011 and May 10, 2012 demonstrated that the impoundment was again leaking. (F.F. 55)

⁵Problems continued after the filing of Mr. Kiskadden's complaint. For example, on July 14, 2011, without obtaining prior approval from the Department, Range flushed the drill cuttings pit with 30,000 gallons of water. (F.F. 64) At the time of the flushing, the soil still contained contaminants above background levels. (T. 482-83) The Department's Mr. Yantko expressed concern with this action because flushing the pit could cause contaminants in the soil to be pushed further into the ground and into groundwater. (T. 485, 678)

the Department sent a letter to Mr. Kiskadden informing him that the Department had completed its investigation and had concluded that his water supply had not been impacted by gas drilling activities. Mr. Kiskadden appealed the Department's determination to the Pennsylvania Environmental Hearing Board (Board). The parties engaged in extensive, often heated, discovery⁶ and filed numerous pretrial motions. The Board's electronic docket contains 400 docket entries for this case.

On January 9, 2012, shortly after the filing of the appeal, the Department moved to dismiss the case on the basis that the Department's September 9, 2011 letter was not an appealable action. In an Opinion and Order issued on May 16, 2012, the Board denied the Department's motion, holding that "[w]here the Department conducts an investigation of a water supply complaint under the Oil and Gas Act and makes a determination that the permittee's activities have not affected the water supply, that determination is appealable to the Environmental Hearing Board by the complainant." *Kiskadden v. DEP*, 2012 EHB 171. On December 12, 2012, Range filed a discovery motion seeking authorization to enter onto Mr. Kiskadden's property to conduct various tests of his air, soil, water and septic system, involving both visual observations and more invasive methods, including drilling. The Board held oral argument on Range's motion on December 20, 2012 and issued an Opinion and Order in which we granted permission to Range to perform limited and minimally invasive testing on Mr. Kiskadden's property. *Kiskadden v. DEP*, 2013 EHB 21. As we held in that Opinion, "[t]he main purposes of discovery are so all sides can accumulate information and evidence, develop the facts necessary to support their legal contentions, plan trial strategy and ascertain the strong points and weaknesses of their respective positions." *Id.* at 24 (*citing Clean Air Council v. DEP*,

⁶ For example, in its post hearing brief, the Department states that it produced 10,000 pages of documents in discovery, and its employees underwent 15 days of depositions.

2013 EHB 9, 11). To our knowledge, Range did not perform any of the testing that was authorized by our Order.

On July 19, 2013, following oral argument, the Board granted the Appellant's Motion to Compel Discovery Responses from the Permittee and ordered Range to respond to discovery that had been served on it by Mr. Kiskadden (the July 19, 2013 Order). The discovery included a request for a list of all products and composition of all products used at the Yeager site. The Board ordered Range to respond to the discovery request on or before August 20, 2013. Range argued that it was unable to obtain this information because it was proprietary. It offered to reverse engineer the products used at the Yeager Site in order to determine their chemical composition. The results of the reverse engineering failed to obtain nearly all of the requested information. Therefore, on September 17, 2013, the Appellant filed a Motion for Contempt and for Sanctions in the Form of an Adverse Inference as a result of Range's failure to fully comply with the July 19, 2013 Order. The Appellant requested that the Board preclude Range from arguing that its drilling operation had not caused pollution to his water well.

As a sanction for Range's failure to comply with the Board's July 19, 2013 Order, the Board granted the Appellant's motion in part. Although the Board denied the Appellant's motion for an adverse inference because the requisite criteria had not been met, we granted the Appellant a rebuttable presumption which eliminated the Appellant's need to prove that chemicals found in his water well were contained in products used at the Yeager site. In an Opinion issued on June 10, 2014, Chief Judge Renwand ruled as follows:

While we disagree that spoliation has occurred, since Range has not engaged in the destruction or withholding of evidence, we do agree that it, as the party that used the products in question, bears some responsibility for producing information regarding the chemical composition of the products. We have determined after extensive argument and briefing that the Appellant has a right to

such information through discovery, and the party in the best position to obtain this information is Range, the purchaser and user of the products.

Range argues that the product information is equally accessible to the Appellant and that the Appellant should be seeking this information directly from the manufacturers. We think it disingenuous of Range to suggest that the Appellant has just as much access to this information as does Range. As the purchaser of the products, Range is certainly in a much better position to obtain this information from the manufacturers or suppliers, particularly if it continues to be a customer. Range exercises control over which manufacturers and suppliers it uses to purchase the chemicals and products used at its operation and has much better access to information about the products than does the Appellant.

Kiskadden v. DEP, 2014 EHB 380, 385-86.

Shortly before trial was set to begin, the parties filed numerous motions in *limine*. Included among those motions was the Appellant's Motion to Strike Expert Reports and Expert Rebuttal Reports and for Expedited Consideration Thereof. The motion sought to prevent Range from introducing the testimony of three expert witnesses whose expert reports were filed on August 22 and 24, 2014, after the deadline agreed to by the parties and without seeking leave of the Board. The Board issued an Opinion and Order on September 12, 2014 granting the Appellant's motion, finding that the filing of the untimely reports severely prejudiced the Appellant. *Kiskadden v. DEP*, 2014 EHB 626.

The Board held a twenty day trial on Mr. Kiskadden's appeal from September 22, 2014 through November 19, 2014 with Chief Judge Thomas Renwand presiding. Additionally, Judge Renwand conducted two site views, the first on October 19, 2012 and the second shortly before the start of trial in September 2014. The record consists of a transcript numbering 4,931 pages and hundreds of exhibits consisting of thousands of pages. Following the trial, the parties filed

post hearing briefs on February 27, 2015 and reply briefs on April 24, 2015. Based on the voluminous record developed in this case, the Board makes the following findings of fact:

FINDINGS OF FACT

1. The Appellant is Mr. Loren Kiskadden, an individual residing at 771 Banetown Road, Amwell Township, Washington County, Pennsylvania 15301. (Notice of Appeal; T. 2241) He maintains a mobile home on his property. (T. 2241) He moved into this residence in 2008. (T. 2244)

2. The Permittee is Range Resources – Appalachia, LLC, which operates the Yeager gas well site in Amwell Township, Washington County, Pennsylvania. (T. 90-94)

3. The Department of Environmental Protection is the agency charged with administering and enforcing the Oil and Gas Act, Act of February 14, 2012, P.L. 87, *as amended*, 58 Pa. C.S. §§ 3201-3274; and its predecessor, the 1984 Oil and Gas Act, Act of December 19, 1984, P.L. 1140, *as amended*, 58 P.S. §§ 601.101 – 601.605; and the rules and regulations promulgated under these acts.

4. Mr. Kiskadden’s property is located approximately ½ mile, or approximately 2,900 feet, southwest of the Yeager site. (T. 90, 95, 96, 785, 786, 1321, 4284)

5. The Yeager site sits at a higher elevation than Mr. Kiskadden’s property. (T. 785, 2045)

6. Banetown Road is at a higher elevation than Mr. Kiskadden’s property. (T. 4599-4600)

7. Horses graze on the other side of Banetown Road across from Mr. Kiskadden’s property. (T. 106, 109-10)

8. Bane Creek flows behind Mr. Kiskadden's property. (T. 1486, 1494; Range Ex. 222)
It flows from the northwest to the south/southeast. (T. 1494)
9. A small stream, Unnamed Tributary 4, runs north-south to Bane Creek. It begins on property owned by Ron and Sharon Yeager to the west of the Yeager site, enters a culvert under the road in front of Mr. Kiskadden's property, and runs through Mr. Kiskadden's property until it enters Bane Creek. (T. 712, 1237-38, 1244, 1449, 3510-11; Range Ex. 222) Unnamed Tributary 4 begins in a pasture where two springs known as the Yeager springs are located. (T. 838-39)
10. Mr. Kiskadden's water supply consists of a water well on his property, approximately 150 feet from his home. (T. 101-03, 795; Range Ex. 222)
11. Unnamed Tributary 4 is approximately 50 feet northwest of the water well. (T. 103-04, 712)
12. The water well is approximately 11-12 inches in diameter. It has an uncemented casing that is flush to the ground. It is covered by an unsecured metal cap and surrounded by a ring that is not water-tight. (T. 102-03, 125-26, 128-29, 715-17, 791-95)
13. Mr. Kiskadden believes that his well is 300-397 feet deep. (T. 714-15, 2261) He believes his well pump retrieves water at a depth of approximately 150-175 feet. (T. 2263)
14. Mr. Kiskadden's well shows signs of surface water infiltration. There is mud or dirt on the wiring on the inside of the well and on the inner walls. (T. 103, 716-17, 791-97; DEP Ex. 2, photograph 215)
15. Puddles of surface water have been observed near Mr. Kiskadden's well. (T. 742-43, 834, DEP Ex. 2, photograph 204)

16. Mr. Kiskadden's property is located adjacent to a vehicle scrap yard which was operated by Mr. Kiskadden's family. (T. 106-09, 2270, 2379-81, 2405-09) Remnants of vehicles remain on the property. (DEP Ex. 2, photographs 211 and 213; T. 788, 790, 2354-55)

17. Vehicles were disassembled and fluids drained at the scrap yard. (T. 2380-84)

18. Additionally, Mr. Kiskadden's property contains vehicles, a bus and pieces of salvaged items. (T. 788-90, 2268-69, 2346-55) He stored a boat on his property at one time. (T. 2361) He has used a backhoe to scrap vehicles on his property. (T. 2350-51) People have washed cars on his property in the front yard and behind a trailer on his property. (T. 2373-74)

19. Mr. Kiskadden has used an acetylene torch to cut up cars, metals and old appliances on his property. (T. 2385-87)

20. Mr. Kiskadden has a septic system on his property. (T. 2340-41) From the time that Mr. Kiskadden moved into his residence in 2008 until his complaint in 2011, he did not take any action to maintain the septic system. (T. 2341)

21. Mr. Kiskadden replaced the pump to his well in February, March or April of 2013 because it stopped operating. (T. 2262-63, 2297) Mr. Kiskadden testified that when he removed the old pump, "all this brown stuff buildup came off of it and just kept falling off and the pump itself was all plugged up, looked like it had some kind of stuff wrapped around it. It was real hard." (T. 2263)

22. Mr. Kiskadden had never done any work on his well prior to his complaint. (T. 2290)

23. The Yeager drill site is located on McAdams Road in Amwell Township, Washington County, Pennsylvania. (DEP Ex. 17; Range Ex. 222)

24. Range produces gas from unconventional gas wells at its Yeager site. “Unconventional” means that the drilling occurs into shale rather than cavities filled with oil or natural gas. (T. 1802, 4023-24)

25. At the time period relevant to this appeal, the Yeager site included a centralized impoundment, a drill cuttings pit and a mud processing pit. (T. 2515; Range Ex. 222).

26. There are three wells on the Yeager site: wells 1H, 2H and 7H. (DEP Ex. 17) The first to be drilled was the 7H well, which Range began drilling on September 11, 2009; the vertical drilling was completed on November 13, 2009 to a depth of 7,200 feet. (T. 4030-31, 4040) The well was then horizontally drilled and hydraulically fractured in December 2009. (T. 4043-44)

27. Hydraulic fracturing creates induced fractures by which natural gas is released from low permeability rocks. (T. 4123-50)

28. After the shale is fractured, the water absorbs constituents that are naturally present in the shale which causes the water to become salty or briny. (T. 4123-24, 4144-45)

29. Flowback water is a water-based fracturing fluid that flows back to the surface after the completion of hydraulic fracturing. (T. 4144-45)

30. The 7H well produces gas from the Burkett Shale within the Upper Devonian Shale Formation at a depth of approximately 7,200 feet. (T. 3380)

31. The Upper Devonian Shale is above the Marcellus Shale. (T. 4044)

32. From December 23, 2010 to January 17, 2011 the vertical portions of the 1H and 2H wells were drilled, but they were not hydraulically fractured until 2014. (T. 4048-50)

33. The impoundment was constructed for the purpose of storing oil and gas waste fluids, flowback and production water. (T. 94, 217-18)

34. Fluids in the impoundment were dominated by chlorides. (T. 416, 422-23, 1839-45, 2632-33)

35. The drill cuttings pit was constructed for the purpose of holding drill cuttings, drilling fluid and related residues generated during the drilling of the 7H well. (T. 93)

36. The drill cuttings pit leaked on or about March 24 or 25, 2010. (T. 772-77; Range Ex. 41) The pit again leaked in May 2011. (T. 4292; Appellant's Ex. 310)

37. There are springs on the Yeager property located approximately 200 feet northwest of the location of the drill cuttings pit. (T. 95; Range Ex. 222)

38. The March 2010 leak from the drill cuttings pit caused contamination to the Yeager springs. (T. 175, 4282, 4535)

39. Pre-drill sampling of the Yeager springs showed that total dissolved solids were present at a concentration of 301 mg/l and chlorides at 3.7mg/l. (Appellant's Ex. 252)

40. Following the leak, chlorides in the Yeager springs went up to a high of 981 mg/l, compared to predrill levels of 3.7 mg/l. (T. 658, 1879-81, 2201-03, 4541, 4542; Range Ex. 203D)

41. Following the leak, sodium levels in the springs had a less dramatic increase. They went up to 58.1 mg/l compared to predrill levels of 6.06 mg/l. (T. 658, 1880, 2201-03, 4543; Range Ex. 203D)

42. The water type signature of the Yeager springs changed from calcium bicarbonate to calcium chloride as a result of pollution from the Range operation. (T. 4546, 4550)

43. Contamination of the Yeager springs provides a case study and comparison of what contamination from operations at the Yeager site would look like. (T. 4535)

44. Contamination in the springs could have made its way to Unnamed Tributary 4. (T. 839-40)

45. On April 12, 2010, fluid was placed into the impoundment on the Yeager site before a hole had been patched. (T. 875-77; Range Ex. 41)

46. On June 18, 2010, ten gallons of drilling mud were spilled onto the ground at the Yeager site. (T. 882-83; Range Ex. 41)

47. On July 14, 2010, flowback water overflowed a secondary containment at the Yeager site. The Department was unaware of how much fluid was released. (T. 936)

48. The impoundment was treated for hydrogen sulfide on August 10, 2010, after the Department received complaints of a hydrogen sulfide odor at the Yeager site. (T. 452, 941-43, 2184)

49. On August 18, 2010, a spill of approximately 42-84 gallons of brine water occurred at the site. (T. 299)

50. On August 24, 2010, a “couple hundred” gallons of clarified brine spilled from a tank outside the containment area on the Yeager site. (T. 306-07)

51. Additionally on August 24, 2010, holes were discovered in the containment system under tanks at the Yeager site. (T. 318-20)

52. A leak in the impoundment on the Yeager site was discovered in November 2010 based on testing performed on November 10 and 19, 2010. (T. 417-18, 421-24; Range Ex. 211H, 211K, 213E)

53. Range failed to report sampling results to the Department that may have indicated there was a leak in the impoundment. (T. 404, 407, 410, 418)

54. The impoundment's leak detection zone was located underneath the liner; as a result, leaks would not be detected until the fluid had already come into contact with the ground. (T. 349, 350, 451)

55. Subsequent leaks of the impoundment were detected in August and September 2011 and May 2012. (T. 431; Appellant's Ex. 289 and 291; Range Ex. 212D)

56. On December 7, 2010, the secondary containment at the Yeager impoundment overflowed. (T. 921) Also on that day, 15 gallons of diesel fuel spilled in the same area. (T. 921)

57. On January 3, 2011, 10-15 barrels of blended water, consisting of flowback, frac water or treated water, was released onto the ground at the Yeager site. (T. 850-51)

58. On January 26, 2011, a leak occurred from a transfer line that was transferring flowback water between the Yeager site and another drill site, and approximately 3.5 barrels of flowback leaked onto the ground. (T. 939-40)

59. On February 8, 2011, a truck overturned at the Yeager site spilling a load of frac water, diesel fuel and oil. (T. 851-53)

60. On March 10, 2011, a truck left its valve open and approximately 100 gallons of fluid was spilled onto the ground at the Yeager site. The spill ran down the access road, across McAdams Road and onto the Yeagers' field. (T. 853-55, 864-65) The amount of fluid was reported by Range to be 20-25 gallons, but the driver believed it to be approximately 100 gallons. (T. 854-55, 864-65; Range Ex. 55; Appellant's Ex. 50)

61. Range reported the March 10, 2011 spill as being only a 20-25 gallon spill despite the fact that it covered an area 70 feet long by 50 feet wide in the Yeager field. (T. 983-86; Appellant's Ex. 272)

62. On June 2, 2011, a truck left its valve open at the Yeager site and spilled recycled water that had been removed from the Yeager impoundment. (T. 327)

63. On July 13, 2011 a seep was discovered coming out of the Yeager impoundment. (T. 1329-30, 1874-75)

64. On July 14, 2011, Range flushed the drill cuttings pit with 30,000 gallons of water without permission from the Department. (T. 486) The flushing could have caused contaminants to be pushed into the groundwater. (T. 678)

65. During remediation of the drill cuttings pit soil samples were collected and a number of contaminants were found in the soil. (T. 496-98; Appellant's Ex. 91)

66. Sodium was one of the contaminants found in the soil under the drill cuttings pit and one that Range had difficulty bringing under control. (T. 2108-09; Appellant's Ex. 81) Sodium concentrations in the soil exceeded chloride concentrations. (T. 4360-61)

67. On or about June 3, 2011, the Department received a telephone complaint from Mr. Kiskadden regarding his water supply. (T. 2281; Notice of Appeal) Mr. Kiskadden reported that while he was filling a child's size swimming pool, the water became cloudy, began foaming, contained sediment and had an odor of rotten eggs. (Notice of Appeal; T. 114, 714, 2246-47, 2249, 2281)

68. An odor of rotten eggs may be indicative of hydrogen sulfide. (T. 738)

69. It is not unusual for water wells to experience a hydrogen sulfide odor. It can be caused by changes in the barometric pressure and water table. (T. 965, 2191-92)

70. On June 6, 2011, Department Water Quality Specialist, Bryon Miller, went to Mr. Kiskadden's home. He interviewed Mr. Kiskadden, inspected the well and the surrounding area, and took a sample of Mr. Kiskadden's water. (T. 696, 713-15, 720, 782-83, 803)

71. On the day of Mr. Miller's visit, the water was clear and had no odor. (T. 720, 721, 735, 739; DEP Ex. 3)

72. The June 6, 2011 sampling of Mr. Kiskadden's water showed the presence of various constituents, including the following: 748 mg/l of total dissolved solids, 297 mg/l of sodium, 44.3 mg/l of chlorides, 5.162 mg/l of calcium, alkalinity of 592.2 mg/l, and a pH level of 9.0. (DEP Ex. 3) It also showed the presence of coliform bacteria. (DEP Ex. 3, 13)

73. On June 9, 2011, a contractor for Range also sampled Mr. Kiskadden's water. The sampling results included the following: 670 mg/l of total dissolved solids, 305 mg/l of sodium, 33.38 mg/l of chlorides, 4.57 mg/l of calcium, alkalinity of 612 mg/l, and a pH of 9.1. (DEP Ex. 8, 30)

74. On July 27, 2011, Range's contractor again sampled Mr. Kiskadden's water. The sampling results included the following: 1120 mg/l of total dissolved solids, 285 mg/l of sodium, 39.2 mg/l of chlorides, 13.5 mg/l of calcium, alkalinity of 554 mg/l, and a pH of 8.4. (DEP Ex. 8, 30)

75. Due to the elevated levels of sodium and total dissolved solids in the Department's June 2011 sample results, the Department returned to the property on August 1, 2011 to sample for volatile organic compounds. (T. 601-02, 722, 803) On that date, the water had a slight odor of hydrogen sulfide (or rotten egg smell). (T. 738, 803)

76. The Department's August 1, 2011 sampling showed that Mr. Kiskadden's water contained low levels of acetone, t-butyl alcohol and chloroform. (T. 804-05; DEP Ex. 6)

77. Acetone, t-butyl alcohol and chloroform are present in drilling fluids, but are not unique to drilling fluids. (T. 1917-18, 2812-13, 3488-90)

78. It would not be uncommon to find organic compounds such as acetone, t-butyl alcohol or chloroform in Mr. Kiskadden's water supply due to its proximity to Banetown Road, agricultural operations, the adjacent salvage yard and vehicles on his property. (T. 1856-57)

79. Acetone is naturally occurring in the environment and is associated with the degradation of organic constituents. (T. 4601-02)

80. A field blank sample taken on the same day as the sampling of Mr. Kiskadden's well contained acetone. (T. 813) A field blank sample is a sample that is filled with pure water and sent for analysis under the same conditions as the actual sample in order to verify that proper handling procedures are followed and to ensure that no field contaminants are in the sample. (T. 736-37, 1175-77).

81. The presence of acetone in the blank sample could be an indication that the acetone was a field contaminant. (T. 813, 4603-05, 4607-08)

82. At the direction of the Department, in June or July 2011 Mr. Kiskadden began pouring bleach into his water well in order to kill bacteria and/or eliminate the rotten egg odor. (T. 2254, 2312-15, 2317) Mr. Kiskadden did not dilute the bleach. (T. 2312-15) Bleach can cause chloroform to appear in water. (T. 300-01, 1856-58, 2087, 2812, 2922, 3037)

83. Gasoline from vehicles can be a source of t-butyl alcohol. (T. 2922, 4595)

84. Department hydrogeologist, Michael Morgart, conducted a hydrogeological study of the area that includes Mr. Kiskadden's well and the Yeager site. (T. 1807)

85. Mr. Morgart concluded there was no obvious hydrogeological connection between the Yeager site and Mr. Kiskadden's water well. (T. 1681)

86. On September 9, 2011, the Department sent Mr. Kiskadden a letter stating that it had completed its investigation of his water supply complaint and had not determined that his well was impacted by oil and gas well related activities. (DEP Ex. 13)

87. In January 2012, counsel for Mr. Kiskadden called the Department regarding Mr. Kiskadden's water quality. (T. 815, 2403-04)

88. On January 26, 2012, at the request of Mr. Kiskadden's legal counsel, the Department again sampled Mr. Kiskadden's water. (T. 723-24, 731-33, 815, 2403-04) On that date, the water was clear with no odor. (T. 723-24, 731-33; DEP Ex. 9)

89. The results of the January 26, 2012 included, *inter alia*, the following: 652 mg/l of total dissolved solids, 163 mg/l of sodium, 41.6 mg/l of chlorides, 47.7 mg/l of calcium, alkalinity of 460 mg/l, and a pH of 8.2. (T. 723-24, 731-33, 738-39; DEP Ex. 9)

90. EPA sampled Mr. Kiskadden's water on March 27, 2012. (Appellant's Ex. 297) The sampling included, *inter alia*, the following results: 666 mg/l of total dissolved solids, 265 mg/l of sodium, 41.2 mg/l of chlorides, 6.46 mg/l of calcium, 15.5 mg/l of methane, 0.291 mg/l of ethane and a pH of 8.93. (DEP Ex. 15, 30) Acetone, t-butyl alcohol and chloroform were not present at reporting limits. (T. 1902-03, 2025, 4611-12, DEP Ex. 15) Propane and butane were not detected above the quantitation limit. (DEP Ex. 15)

91. As of March 27, 2012, Mr. Kiskadden's water did not contain acetone, t-butyl alcohol or chloroform. (T. 3007; DEP Ex. 15)

92. None of the parties produced sampling results more recent than March 27, 2012 at trial.

93. Mr. Kiskadden testified that he has continued to experience problems with his water, including odor, discoloration and clogs in his toilet and hot water tank from sediment. (T. 2258-

59, 2273-74) He testified that the odor “comes and goes” and returns more frequently the more water he uses. (T. 2311) He testified that his water has foamed and bubbled “a couple of times.” (T. 2409)

94. A number of constituents found in sampling at the Yeager site were also present in Mr. Kiskadden’s water. (Appellant’s Ex. 275, 278, 284, 289, 291, 295, 297; DEP Ex. 3, 8, 9, 30)

95. A number of the constituents found in Mr. Kiskadden’s water can be naturally occurring. (T. 1845-46, 2962, 3643-44, 3906, 4432, 4490-91, 4818-19)

96. Groundwater can contain minerals, chemicals, biological substances and metals. (T. 2915-16) Arsenic, aluminum, antimony, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, magnesium, mercury, manganese, molybdenum, nickel, phosphorous, potassium, selenium, silica, silver, thallium, uranium, vanadium, and zinc all exist naturally in groundwater in Pennsylvania, and in groundwater in Washington County in particular. (T. 2916, 2962-2967)

97. Gas well related waters typically exhibit elevated chlorides, sodium and calcium concentrations, high total dissolved solids and heavy metals. (T. 1578-79, 1827, 1836)

98. Mr. Kiskadden’s water exhibits high levels of sodium and total dissolved solids, but does not exhibit high levels of chlorides. (T. 1843)

99. In gas well related waters, concentrations of chloride typically exceed sodium by two to three times. (T. 164, 1827, 1836, 1844-47)

100. The chlorides in Mr. Kiskadden’s water were significantly lower than the level of sodium. (T. 1843-47)

101. Mr. Kiskadden’s water samples are not typical of water impacted by gas well related activity. (T. 1843-44, 1846-47)

102. If the sodium levels in Mr. Kiskadden's water were attributable to impacts from oil and gas-related fluids, one would have expected to see chloride levels that were ten to twenty times higher. (T. 1847)

103. Chloride is a conservative anion, which means that it does not engage in chemical reactions with the material through which it flows. (T. 1835, 3798-99)

104. Chlorides migrate more quickly through groundwater than other constituents do. (T. 1585-86, 2633-34, 4530-34)

105. Sodium is less conservative than chlorides. It chemically and physically interacts with the media through which it travels and the constituents with which it travels. (T. 1898-99, 2188, 2199, 2200, 3469-70)

106. Sodium may interact with soil by absorbing onto it. (T. 2188-89, 4636-41)

107. Sodium found in soil samples does not necessarily translate into sodium in groundwater. Sodium may leave the groundwater and bind to the soil. (T. 2004-05, 2110-11, 2188-89)

108. Some sodium will remain in soil or clay, while chlorides will move through it. (T. 3470)

109. In a release from the drill cuttings pit, it is likely that some of the sodium would have remained in the underlying soil while the chlorides would have migrated through the groundwater. (T. 3470)

110. Properties owned by the Voyles and Haney families are located between the Yeager site and Mr. Kiskadden's property. (Range Ex. 222; T. 4584-85)

111. Springs and wells located on the Voyles and Haney properties were sampled in November 2010 and February 2011. (Range Ex. 179C, 179E, 179H, 198E, 199C, 199E)

112. The sampling results for the Voyles and Haney water supplies show lower levels of chlorides, sodium, total dissolved solids and pH than the samples of Mr. Kiskadden's well. (*Id.*; T. 156-63; DEP Ex. 30)

113. Springs, in particular, provide helpful monitoring points because they provide information about groundwater migration. (T. 4579)

114. Methyl Blue Activated Substance (MBAS) was found in Mr. Kiskadden's water. (T. 2761-62) MBAS refers to soaps. (T. 1220)

115. The Department was not made aware of the presence of certain substances at the Yeager site or in Mr. Kiskadden's water prior to making its determination. (T. 886-87, 2760-63, 2772, 2775)

116. The Department was not made aware that the Yeager impoundment had leaked prior to making its determination. (T. 389-90, 1354-55, 1871-72, 2161-62, 4284)

117. Mr. Kiskadden's well is located in the Washington Formation. (T. 1484)

118. The Greene Formation overlies the Washington Formation. The two formations are separated by the Upper Washington Limestone. (T. 1484-85)

119. There are no predrill samples for Mr. Kiskadden's well. (T. 116)

120. The Department recommends that homeowners test their water for certain parameters prior to the start of drilling operations. (T. 274-76) The list of parameters to be tested includes alkalinity, chloride, conductivity, hardness, oil and grease, pH, sulfate, total dissolved solids, residue (filterable and non-filterable), total suspended solids, barium, calcium, iron, magnesium, manganese, potassium, sodium, strontium, ethane, methane and total coliform/E. coli. (Appellant's Ex. 198)

121. If a homeowner cannot test for the entire package of parameters, the Department recommends a minimum set of parameters that should be tested. At the time period in question, the minimum number of parameters included the following: sodium, methane, ethane, pH, total dissolved solids, iron and manganese. It did not include chloride. (T. 277, 1949; Appellant's Ex. 198)

122. Chloride was not added to the list of minimum parameters to be tested until 2014, during this litigation. (T. 1949-50)

123. The water chemistry type of Mr. Kiskadden's water is sodium bicarbonate. (T. 4468-69)

124. Sodium bicarbonate water often has higher methane concentrations because it consists of deeper groundwater that is further from a recharge area. (T. 4844-45)

125. Sodium bicarbonate water is common in valley settings in Washington County and has been part of the groundwater system since glaciation. (T. 4468-69, 4816-17)

126. A published groundwater survey of Washington County documents occurrences of groundwater having sodium levels in excess of chloride levels. (T. 4852-55)

127. Mr. Kiskadden's water type signature is consistent with the water type in his area and Washington County. (T. 4468, 4477-78, 4619-20)

128. Elevated total dissolved solids, sodium, pH and alkalinity is the natural background condition of much of the groundwater in the area of Mr. Kiskadden's water well. (T. 1850-53)

129. The consistency of Mr. Kiskadden's water sample results over time indicates that the water quality is attributable to natural conditions, rather than spills or releases related to oil and gas activities. (T. 1846-47, 1855-56, 1872-73)

130. Background levels for groundwater in southwestern Pennsylvania do not always meet drinking water standards. (T. 1424-25, 579-81, 4743-44) Many background chloride concentrations in Washington County exceed drinking water standards. (T. 4490-91)

131. Hillside springs are not good comparisons of background water quality for wells in valley settings because they have different water signature types due to different residence times, i.e., the amount of time the water has spent in contact with rocks. (T. 4467-68, 4504-13)

132. Springs typically intersect shallow groundwater. (T. 1466-67, 1482, 1495, 1556-57)

133. The Yeager and Puscarich springs are at higher elevations than the Kiskadden well and, therefore, they do not intercept the same rock units as Mr. Kiskadden's well. (T. 3439)

134. As groundwater gets deeper, it is exposed to rock units for a longer period of time, causing changes in groundwater due to the chemistry that occurs when water interacts with rock formations. (T. 1466, 2914-15)

135. The water chemistry of hillside wells and springs is usually calcium bicarbonate characterized by low total dissolved solids, whereas valleys have sodium bicarbonate or sodium chloride groundwater. (T. 4508-20)

136. Because the water chemistry is different, predrill samples for the springs on the Yeager farm do not serve as accurate indicators of the predrill water quality of Mr. Kiskadden's well. (T. 1876-78, 1881, 4517-22)

137. Mr. Kiskadden's mother, Grace Kiskadden, lives at 789 Banetown Road, in the Bane Creek Valley. (T. 2390-94, 2405-06) Her well is located approximately 0.2 miles upstream of Mr. Kiskadden's well, along Bane Creek. (T. 1535)

138. Sampling results for Grace Kiskadden's well are similar to those for Mr. Kiskadden's well in that they show high levels of sodium and alkalinity, high pH, lower chlorides, and calcium and total dissolved solids in a similar range as Mr. Kiskadden's. (T. 1883-84)

139. Grace Kiskadden's water also contains methane. (T. 4846)

140. There is a topographic ridge to the east of Grace Kiskadden's water well. (T. 1545-47)

141. The Department concluded that the ridge acts as a topographic barrier hydrogeologically separating Grace Kiskadden's well from Unnamed Tributary No. 4. (T. 1548-52; DEP Demonstrative Ex. 5)

142. On November 14, 2012 Department water quality specialist, John Carson, took water samples at locations in Bane Creek and Unnamed Tributary 4. (T. 1214, 1234; DEP Ex. 29)

143. Sample Bane 01 was taken in Bane Creek downstream from Mr. Kiskadden's property. Sample Bane 02 was taken in Unnamed Tributary 4 across the road from Mr. Kiskadden's property before entering his property. Sample Bane 03 was taken upstream of Mr. Kiskadden's property as a control sample. (T. 1237-38; DEP Ex. 29)

144. Sample Bane 02 had a chloride concentration of 29.4 mg/l and a sodium concentration of 6.5 mg/l. (T. 1262) These concentrations are lower than the chloride and sodium concentrations in Mr. Kiskadden's water supply. (DEP Ex. 30)

145. Methane and ethane were detected in Mr. Kiskadden's well in the August 1, 2011 sampling conducted by the Department and the March 27, 2012 sampling conducted by EPA. (DEP Ex. 6; Appellant's Ex. 297)

146. There are two primary types of methane: biogenic and thermogenic. (T. 1859)
147. Biogenic gas results from bacterial action. There are two types of bacterial action: (a) fermentation, where bacteria act upon organic material and (b) carbon dioxide reduction, where bacteria act upon carbon dioxide and convert it to methane. (T. 1859)
148. Thermogenic gas results from heat and pressure at great depths. (T. 1859)
149. Gas produced from the Marcellus Shale is thermogenic. (T. 1863)
150. Isotopic analysis can determine the type of gas. (T. 1863-65)
151. All three parties' experts plotted the gas in Mr. Kiskadden's well as carbon dioxide reduction. (T. 1863-66, 2791, 3016, 4618, 4624; DEP Demonstrative Ex. 12)
152. Although Mr. Kiskadden's expert, Dr. Sommer, testified that the methane in his well was deep seated, he did not testify that it was thermogenic. (T. 3015-16, 3020-21)
153. Dr. Sommer did not testify that the methane in Mr. Kiskadden's well migrated from Range's well lateral to Mr. Kiskadden's water well. (T. 2944)
154. Methane can be naturally occurring in wells in Washington County and southwestern Pennsylvania, either from coal seams or from biological processes involving carbon dioxide reduction. (T. 1858-59)
155. The isotopic ratio for the ethane in Mr. Kiskadden's water is different than that of Range's wells. (T. 1929-39, 2190)
156. Ethane can be produced by bacteria and can be present in biogenic gas. It can come from coal seams. (T. 2925-26, 4615-16)
157. Strontium ratios can be used to identify the age and likely source of water. (T. 3288-89)

158. The Marcellus Shale is the target formation of the Yeager 1H and 2H wells. The Upper Devonian Shale is the target formation of the 7H well. (T. 3380)

159. Mr. Kiskadden's strontium ratio is outside the established ranges for the Marcellus Shale and Upper Devonian Shale in Washington and Greene Counties. (T. 3450-51, 3456-57)

160. Mr. Kiskadden's strontium ratio is within the established range for water in the Pittsburgh coal seam. (T. 3449-52)

161. Shale rock near the Yeager site is a poor transmitter of water. Fractures tend to fill with clay. (T. T. 4460-61)

162. Siltstone and limestone in the Greene and Washington Formations also tend to be poor transmitters of water. (T. 4461)

163. Coal is a good transmitter of water in southwestern Pennsylvania. (T. 4461)

164. Instead of moving through the rock units in the area surrounding Mr. Kiskadden's well, groundwater tends to move laterally along the bedding planes. (T. 4455-60)

165. Although predrill samples of the Yeager springs are not indicative of predrill levels for Mr. Kiskadden's water supply, the manner in which they were impacted by contamination from Range's operation is instructive in determining whether Mr. Kiskadden's water supply was also impacted. (T. 4535)

166. The Myers computer models, on which Mr. Kiskadden's expert hydrogeologist, Paul Rubin, relied, posit that vertical migration of gas and fluids from the target shale to the surface could occur in "tens or hundreds of years." (T. 3613) Less than two years had passed between the hydraulic fracturing of the 7H well and Mr. Kiskadden's June 2011 water supply incident. (T. 3616-17)

167. “Raw data” are the numbers generated when a sample is put through a laboratory instrument. (T. 1016, 1028-29)

168. Raw data must be verified by a laboratory analyst in order to be considered reliable. (T. 1014-16)

169. Results falling below the “reporting limit” are considered to be estimated. (T. 1031-34, 1059, 1109)

170. A “detection limit” (or “method detection limit”) is the concentration at which the instrument detects the presence of a parameter in a sample. The detection limit falls below the reporting limit. Values below the detection limit are considered to be electronic noise and do not indicate that a parameter was actually present in a sample. (T. 1032-34, 1061-62)

171. “Electronic noise” means that the analyst is not able to determine whether the analyte was actually detected or whether it is simply the result of the instrument’s background signal. (T. 1034)

172. Where a result falls below the reporting limit but above the detection limit, it is considered to be detected to a 99% degree of certainty, but the actual numeric value is not verified to a scientific degree of certainty. (T.1033, 1059, 1109) In other words, one can be 99% certain that the parameter was detected at some level above zero, but one cannot rely on the accuracy of the exact numeric level shown in the sample results because the amount is too small to be quantified. (T. 1059, 1061-62, 1109)

173. On July 24, 2014, the Department issued a Notice of Violation to Range for, among other things, leaks from the Yeager impoundment. (Appellant’s Ex. 101)

DISCUSSION

Applicable Law

The parties agree that the law applicable to this appeal is the 1984 Oil and Gas Act, Act of December 19, 1984, P.L. 1140, *as amended*, 58 P.S. §§ 601.101 – 601.605, which was in effect at the time the Department took its action,⁷ and the rules and regulations promulgated thereunder. Under both the 1984 law and the current law, a gas well operator who affects a public or private water supply by pollution or diminution must restore or replace the supply with an alternate source of water adequate in quality or quantity.⁸ The Department is charged with investigating any such claims and ordering restoration or replacement where it determines that a water supply has been impacted.

Range's Motion for Directed Adjudication

Following the presentation of the Appellant's case, Range moved for a directed adjudication. In *Krushinski v. DEP*, 2008 EHB 579, 581, Judge Coleman explained that a directed adjudication is similar to a motion for directed verdict and requires a showing that the appellant failed to establish a *prima facie* case. However, because we are deciding this case on the merits, we need not make a ruling on the motion. As Judge Beckman explained in *Winner v. DEP*, 2014 EHB 1023, 1024, "when ruling on a motion for a directed adjudication, the Board considers all of the evidence submitted by all the parties—the same evidence it would consider if adjudicating the merits." (*quoting Krushinski, supra*, and *citing Charles E. Brake Co. v. DEP*, 1999 EHB at 967-68, and *Ron's Auto Service v. DER*, 1992 EHB 711, 722).

⁷ This law was superseded in 2012 by the current Oil and Gas Act, Act of February 14, 2012, P.L. 87, 58 Pa. C.S. §§ 3201 – 3274.

⁸ This language is found in Section 3218(a) and (b) of the current Act. The 1984 Act contained similar language.

The Department's Investigation

On June 6, 2011, Department Water Quality Specialist Bryon Miller responded to Mr. Kiskadden's complaint. He went to Mr. Kiskadden's home, took water samples and inspected Mr. Kiskadden's well. He identified that the nearest oil and gas activities to Mr. Kiskadden's home were those at Range's Yeager site. The June 6, 2011 sample results from Mr. Kiskadden's well indicated high levels of sodium and total dissolved solids and a pH level of 9.0. Chlorides were present at a much lower concentration. Range also sampled Mr. Kiskadden's water on June 9, 2011 and July 27, 2011. Those sampling results also indicated high levels of sodium, total dissolved solids and pH, and a lower concentration of chlorides. Due to the high level of sodium and total dissolved solids, Mr. Miller returned to Mr. Kiskadden's home on August 1, 2011 to sample for volatile organic compounds. Those results indicated the presence of methane and ethane, as well as acetone, t-butyl alcohol and chloroform.⁹

In addition to the sampling of Mr. Kiskadden's water, the Department also conducted a study of the hydrogeology of the area. Department hydrogeologist, Michael Morgart, prepared two reports as part of his investigation in which he concluded that a hydrogeologic connection between the Yeager site and Mr. Kiskadden's well would not be expected. The Department summarized the results of its investigation in a letter to Mr. Kiskadden dated September 9, 2011, which stated in relevant part as follows:

Since early June 2011, DEP has been investigating your complaint that Range Resources – Appalachia LLC's ("Range") activities have contaminated your water supply. We have concluded our investigation and cannot make the determination, for the reasons summarized below, that the problems in your water well are caused by gas well related activities, particularly those at the Yeager well site operated by Range.

⁹ Mr. Miller conducted additional sampling of Mr. Kiskadden's water on January 26, 2012, following the issuance of the Department's determination letter. The U.S. Environmental Protection Agency also conducted sampling of Mr. Kiskadden's water on March 27, 2012 as part of a regional survey.

(DEP Ex. 13)

The letter went on to summarize the reasons why the Department had concluded that Mr. Kiskadden's well had not been impacted by Range's operation. These included the hydrology of the area and the chemical make-up of Mr. Kiskadden's water. The Department concluded that the hydrology of the area did not support a link between Mr. Kiskadden's well and the Yeager site because it identified Mr. Kiskadden's recharge area as being to the northwest, whereas the Yeager well site sits to the northeast. The Department also concluded that the water chemistry of Mr. Kiskadden's well did not support a connection to oil and gas related fluids. The Department noted that although gas well waste fluids are high in sodium and total dissolved solids, they characteristically show the highest concentration in chlorides, and the concentration of chlorides in Mr. Kiskadden's well were only 1/8 the sodium level. As for the methane found in Mr. Kiskadden's well, the Department stated that isotopic testing had shown that it was not natural gas originating from a gas well, but, rather, from bacteriological sources. The Department explained the presence of acetone, t-butyl alcohol and chloroform as coming either from laboratory contamination, surface runoff or the salvage yard adjacent to Mr. Kiskadden's property.

Burden of Proof and *De Novo* Review

The Appellant, Mr. Kiskadden, bears the burden of proving by a preponderance of the evidence that the Department erred in determining that Range's operations had not contaminated his water supply. 25 Pa. Code § 1021.122(a); *Kiskadden v. DEP*, 2014 EHB 667. "Preponderance of the evidence" means "that the evidence in favor of the proposition must be greater than that opposed to it." *Clancy v. DEP*, 2013 EHB 554, 572 (quoting *McGinnis v. DEP*, 2012 EHB 109, 125.) In order to meet his burden of proof, Mr. Kiskadden must demonstrate

that contaminants entered his well from operations conducted by Range, whether from the actual operation of its wells, the fracturing process or from leaks and spills that occurred at the Yeager site. To meet this burden, he must demonstrate a hydrogeologic connection between the Yeager site and his well. Mr. Kiskadden does not need to prove that Range used or stored products on its site containing the same constituents that were found in his well.¹⁰ Due to Range's failure to produce information about the products used in its operation in discovery, in violation of a Board order, the Board granted Mr. Kiskadden a rebuttable presumption that the constituents found in his well were also present at the Yeager site. *See, Kiskadden v. DEP*, 2014 EHB 380. The rebuttable presumption reduced the burden that Mr. Kiskadden had to meet in order to prove his case. Nonetheless, even with the reduced burden that had to be met, Mr. Kiskadden did not prove his case.

Mr. Kiskadden attempts to meet his burden of proof by pointing to various errors he contends the Department made in reaching its decision. The alleged errors involve the Department's method of reporting laboratory results and the fact that the Department was not made aware of certain leaks and spills at the Yeager site until after it had made its decision. Mr. Kiskadden is critical of the Department's method of reporting laboratory results for the sampling of his water and other locations including the Yeager site. The Technical Director of the Department's Bureau of Laboratories testified that the lab verified and reported results for only those parameters that were requested. It is Mr. Kiskadden's contention that the entire data package resulting from the testing should have been reported. Mr. Kiskadden also asserts that parameters that were detected but which fell below the reporting limit should have been considered by the Department in determining whether Range's operation had impacted his water supply.

¹⁰ Mr. Kiskadden did, nevertheless, introduce evidence of such.

It is unnecessary to get into a discussion of the Department's Bureau of Laboratories' reporting policy. Whether the entire data package was reported by the Bureau of Laboratories to the Department's program office is irrelevant at this stage of the proceeding. The entire data package was introduced at trial and it is part of the record before the Board. Thus, in the Board's *de novo* review of this matter, all of the data was available to us in reaching our decision. As the Commonwealth Court explained in *Warren Sand & Gravel, Inc. v. Department of Environmental Resources*, 341 A.2d 556, 565 (Pa Cmwlt. 1975):

[T]he Board is not an appellate body with a limited scope of review attempting to determine if [the Department's] action can be supported by the evidence received at [the Department's] factfinding hearing. The Board's duty is to determine if [the Department's] action can be sustained or supported by the evidence taken by the Board.

In other words, *de novo* review means that we decide the case on the record developed before us. *Brockway Borough Municipal Authority v. DEP*, EHB Docket No. 2013-080-L (Consolidated) (Adjudication issued April 24, 2015), *slip op.* at 16. We are not limited to information that may have been available to the Department at the time it made its determination. *Smedley v. DEP*, 2001 EHB 131, 156. The Pennsylvania Legislature and the Commonwealth Court have delineated that the Board is a quasi-judicial tribunal of first impression. As explained in *Smedley*:

The Board proceeding is the *first* instance that a party challenging a DEP action has the right to judicial-type discovery and, in turn, to present evidence so developed to an independent quasi-judicial tribunal. 35 P.S. §§ 7513(a), 7514(c), 25 Pa. Code § 1021.111. The Board is the *first* opportunity any party challenging a DEP action has to a full adjudicatory hearing where one can present a full case in open court with the rights to subpoena witnesses, examine and cross-examine witnesses and present oral and documentary evidence. 35 P.S. §§ 7514(a), (f); 25 Pa. Code §§ 1021.85 – 1021.98, 1021.107 – 1021.108.

Given the nature of this role and function, a standard of review which is premised on the assumption that a full record has been developed below as would be the case of an appellate tribunal reviewing the result of a trial court is not a good fit.

2001 EHB at 157 (emphasis in original).

Thus, we are not dependent on the record developed by the Department or the documents or information it reviewed prior to reaching its decision on the action appealed. *Kiskadden v. DEP*, 2013 EHB 21, 24-25; *Clean Air Council v. DEP*, 2011 EHB 832, 834; *S.H.C. Inc. v. DEP*, 2010 EHB 619, 664. Instead we can consider all relevant and admissible evidence duly presented and admitted at a hearing before the Board. *Kiskadden, supra*, 2013 EHB at 25. In fact, “that record may and almost always does include evidence not previously considered by the Department.” *Rail Road Action and Advisory Committee v. DEP*, 2009 EHB 472, 477.

Because the Board does not simply review a matter on the basis of an already developed record, simply pointing out alleged deficiencies in the Department’s review is generally not enough to meet one’s burden of proof. As Judge Labuskes stated in *Rail Road Action*:

[G]oing through the record to pick at errors the Department may have made along the way in reaching a decision is usually an unnecessary and unproductive distraction. *O’Reilly v. DEP*, 2001 EHB 19, 51. What really matters is whether the Department made the right call in the end.

2009 EHB at 476.

Thus, it is not enough for Mr. Kiskadden simply to demonstrate that the Department did not consider certain evidence in making its decision; rather, he must show that the evidence makes a difference in the final outcome. It is not enough for Mr. Kiskadden to provide hundreds of pages of laboratory data that were not reviewed by the Department. He must demonstrate to

us, the Board, that the laboratory data proves that Range's operations at the Yeager site contaminated his water well.

Likewise, Mr. Kiskadden does not meet his burden of proof by demonstrating that the Department was not aware of certain leaks or spills at the Yeager site prior to making its decision. It is true that there were numerous problems at the Yeager site, including leaks from the impoundment and drill cuttings pit and spills from trucks and other sources. At least one of those leaks resulted in the contamination of springs located on property owned by Ron and Sharon Yeager. It is also true, based on the testimony of Department witnesses and exhibits introduced by the Appellant, that the Department was not made aware of all of the problems that occurred at the Yeager site prior to its September 2011 determination. While we do not take Range's failure to report leaks and spills at its site lightly, this evidence is not dispositive in and of itself. The Appellant argues that if the Department had had prior knowledge of all of the spills and leaks at the Yeager site, the information might have led it to reach a different conclusion. That may be true. But, at this stage of the proceeding, the Appellant's job is not to convince us that the Department might have made a different decision if it had been given additional information by Range, but to convince us, the Board, to reach a different conclusion.

As we held in *O'Reilly v. DEP*, 2001 EHB 19, 45:

Our function in this proceeding is not to critique the Department's procedures generally or as employed in this case. While an inadequate investigatory process may be evidence of a potentially dispositive finding, it is not dispositive in and of itself. . . . Any party who rests on the fact of an inadequate investigation alone does so at its almost certain peril.

Thus, it is normally not enough for the Appellant to argue that the Department has conducted an inadequate investigation. Instead, the Appellant must convince the Board that, based on the record developed at trial, we should overturn the Department's decision. *Id.* As

Judge Mather held in *New Hanover Township v. DEP*, 2014 EHB 834, 865, because our review is *de novo*, our concern is not with procedural mistakes that the Department is alleged to have made along the way, but in whether the record developed before the Board supports the Department's decision (citing *Giordano v. DEP*, 2001 EHB 713, 739).

Moreover, even assuming that proof of an inadequate investigation can justify a remand in some cases, there is no basis for such a remand here. The Department personnel who were assigned to Mr. Kiskadden's case conducted a comprehensive investigation based on the information that was available to them. They studied the hydrogeology of the area and considered the chemical make-up of the Appellant's water. Certainly, the Department's unconventional gas program is new and evolving, and this case has shown that there are areas where it can be improved. However, we do not find the Department's investigation to be severely deficient, as alleged by the Appellant in his post-hearing brief. Nonetheless, any information that the Appellant contends should have been considered by the Department, but was not, has been considered by this Board.

The Appellant must demonstrate to us, the Board, that the leaks or spills or other activities at the Yeager site caused contamination to his well. In order to meet this burden, Mr. Kiskadden must demonstrate – by a preponderance of the evidence – that a hydrogeologic connection exists between the Yeager site and his water well. We find that Mr. Kiskadden has not made that showing by a preponderance of the evidence.

Appellant's Theories of Hydrogeologic Connection

Mr. Kiskadden presented the testimony of Paul Rubin to support his contention that a hydrogeologic connection exists. Mr. Rubin has decades of professional experience as a hydrogeologist, including with the Environmental Protection Bureau of the New York Attorney

General's Office and the New York City Department of Environmental Protection. He has also worked as a hydrogeologist for a private consulting firm and for the Oak Ridge, Tennessee National Laboratory. Mr. Rubin has also spoken at conferences and has presented testimony on what he believes to be the dangers associated with the hydraulic fracturing of gas wells. For this reason, Range argues that we should dismiss Mr. Rubin's testimony in its entirety because he is "grossly biased against natural gas drilling." We disagree with Range's assessment. We are not so naïve as to believe that experts never hold a personal view about the subject matter on which they present testimony. To paraphrase the Appellant: An expert is likely to make certain discoveries through his or her work through scientific research which is likely to shape his or her personal views. (Appellant's Reply to Range's Post Hearing Brief, p. 45) We suspect this is true not just for Mr. Rubin, but for each of the experts who testified in this case. Moreover, a passion for one's work does not necessarily equate to bias. One of the purposes of cross examination is to help us assess an expert's credibility and the weight to give his or her testimony. In this case, both direct and cross examination of the experts was critical in helping us reach a decision. While all of the experts in this case were quite knowledgeable, we found some more persuasive than others under the unique facts of this case.

For example, despite Mr. Rubin's extensive knowledge, we found much of his testimony to be conclusory and difficult to follow. In many cases, he simply provided a conclusion without explanation and frequently did not answer from his own knowledge but based on what he had heard from others. Mr. Rubin spent a great deal of time discussing his work in other cases, rather than answering the questions posed to him about *this* case. In contrast, we found the testimony of Range's expert hydrogeologist, Elizabeth Perry, to be clear, concise and easy to follow. She answered the question at hand and her theories were well articulated and supported.

Ms. Perry holds a Bachelor's degree in math with a minor in geology, as well as a Master's degree in engineering geology with a specialization in hydrogeology. Her testimony on the hydrogeology of the area, groundwater quality and water type signatures was particularly helpful.

Mr. Kiskadden argues that we should not afford any weight to Ms. Perry's testimony because she did not do a study of fractures in the area. Yet, neither did Mr. Rubin perform a study of the fracture network below ground. Mr. Kiskadden asserts that Ms. Perry relied on incomplete data. Yet, her research into groundwater databases for southwestern Pennsylvania was more exhaustive – and more fully explained – than Mr. Rubin's. We find no merit to the Appellant's claim that we should reject Ms. Perry's testimony.

We address each of Mr. Rubin's theories of a hydrogeologic connection below.

1. Underground fractures connection

As part of his investigation, Mr. Rubin went into the drill cuttings pit to examine the exposed bedrock and measure the visible fractures. Fractures provide pathways for the movement of groundwater and contaminants. He also reviewed a contour map of the area and literature regarding a fracture network within the Appalachian Basin. Mr. Rubin concluded that an underground network of fractures provides a direct link between the Yeager site and Mr. Kiskadden's well.

Mr. Rubin's theory is dependent on the fractures that he observed in the drill cuttings pit continuing underground. However, Mr. Rubin admitted that fractures can "anneal" or close with depth. Additionally, Ms. Perry presented credible testimony that strata of lower permeability in the vicinity of the Yeager site would have prevented groundwater from penetrating vertically and would instead cause the groundwater to perch on top and travel horizontally in the direction of

the Yeager springs. The fact that the springs became contaminated after the March 2010 leak from the drill cuttings pit provides evidence of groundwater moving in that direction. In contrast, sampling of water wells and springs on the Voyles and Haney properties located between the Yeager site and Mr. Kiskadden's well had lower concentrations of chlorides, sodium, total dissolved solids and pH than did Mr. Kiskadden's well. This data does not support the theory that contamination is moving toward Mr. Kiskadden's well through a series of fractures.

2. Surface connection

Mr. Rubin posited that contaminants could travel downslope to Mr. Kiskadden's property by means of surface flow. This would involve the migration of fluids from the Yeager site to Unnamed Tributary 4 which flows onto Mr. Kiskadden's property approximately 50 feet from his well. The Department verified that an examination of the inside of Mr. Kiskadden's well indicated that there was surface water infiltration to the well. However, Mr. Kiskadden presented no samples from the portion of Unnamed Tributary 4 that flows on his property to demonstrate that it is, in fact, contaminated. A sample of Unnamed Tributary 4 taken by the Department on November 14, 2012 across the street from Mr. Kiskadden's property, before the tributary enters his property, showed chloride and sodium concentrations lower than the concentrations in Mr. Kiskadden's well. (F.F. 142) Moreover, Mr. Kiskadden did not recall Unnamed Tributary 4 flooding on his property around the time of his complaint. The only time he recalls it flooding over its banks was in the summer of 2010, a year prior to when he says he began to experience problems with his water. (T. 2401) Without more, we cannot find that Mr. Kiskadden has demonstrated by a preponderance of the evidence that surface flow provides a hydrogeologic connection between the Yeager site and his well.

3. Deep Migration Connection

Mr. Rubin also testified that a hydrogeologic connection exists as a result of a deep fracture network created by Range's drilling in the area. According to Mr. Rubin, when a gas well is pressurized deep into a geologic formation, additional fractures are created and existing fractures are expanded, causing new and existing fractures to create interconnections where none previously existed. According to Mr. Rubin, the new fracture networks allow for the upward migration of gas and contaminants into people's water wells. Mr. Rubin mapped the legs of Range's 7H gas well which run under Mr. Kiskadden's property. It is Mr. Rubin's theory that the hydraulic fracturing of the well created a network of fractures that allowed gas and contaminants to migrate to Mr. Kiskadden's well.

However, the literature and studies that Mr. Rubin relies on in support of his theory do not coincide with the timeline involved in this case. The Myers computer model, on which Mr. Rubin relied, posits that vertical migration of gas and fluids from the target shale to the surface could occur in "tens or hundreds of years." (T. 3613) Less than two years had passed between the hydraulic fracturing of the 7H well and Mr. Kiskadden's June 2011 water supply incident. Additionally, the Myers opinion was based on a theoretical computer model that assumed there was a cavity, six-meters in width, extending from drilling depth directly to the ground surface through which gas and other fluids could travel unencumbered.

Methane and Ethane

Mr. Rubin points to the presence of methane and ethane in Mr. Kiskadden's well as evidence of deep upward migration.¹¹ There are various sources of methane and ethane, and they are not necessarily the result of gas drilling. Isotopic analysis is a method used to identify

¹¹ Mr. Kiskadden also contends that propane was detected in his well; however, there is no evidence that it was detected above the detection limit which is necessary for any degree of reliability.

types of gas. This method characterizes gas by utilizing ratios of carbon and hydrogen. All three parties presented expert testimony on the isotopic analysis of the gas found in Mr. Kiskadden's water well. Range presented expert testimony by Ms. Perry on this topic. The Department presented the testimony of Alan Eichler who managed the Department's Oil and Gas Program in the Southwest Region at the time of the Department's determination in this matter. Lastly, the Appellant presented the testimony of Dr. Michael Sommer. Dr. Sommer holds a Bachelor of Science degree in geology, a Master's degree in the analysis and interpretation of gases in rocks and minerals and a Ph.D. in the analysis of lunar rocks.

Mr. Kiskadden urges us to strike Alan Eichler's testimony regarding isotopic gas analysis. Mr. Kiskadden argues that Mr. Eichler is not an expert in this field because he has no formal education or training in isotopic analysis and was simply trained by a colleague. We find that Mr. Eichler is qualified to testify as an expert in the field of isotopic analysis. Mr. Eichler trained with Fred Baldassare, recognized as one of the leaders in the field of isotopic analysis. (T. 1764-65) As the Department correctly points out, technology transfer is a common and recognized means of education for professionals in a technical field. Pennsylvania law permits a person to be qualified as an expert "based upon knowledge, skill, experience, training or education. . ." Pa. R.E. 702 The Department cites to cases where the Board has recognized that technical professionals gain knowledge and expertise through their work: *E.g., UMCO Energy, Inc. v. DEP*, 2006 EHB 489, 546, and *Eagle Environmental, L.P., v. DEP*, 1998 EHB 896, 931-32, *aff'd on other grounds*, No. 2704 CD 1998 (Pa. Cmwlth. October 19, 2001). Additionally, Mr. Eichler took undergraduate and graduate classes at the University of Pittsburgh that discussed isotopes and isotopic analysis. (T. 1748, 1759-60) Based on Mr. Eichler's educational

background and training, we affirm the ruling at trial recognizing Mr. Eichler as an expert on the subject of isotopic gas evaluation.

Mr. Eichler testified that there are two primary types of methane gas: (1) thermogenic, which is created by heat and pressure at great depth, and (2) biogenic, which is created by biological processes. The latter, biogenic gas, can be made through two bacteriological processes: (i) fermentation by bacteria acting on organic material, and (ii) bacterial reduction of carbon dioxide (carbon dioxide reduction). All three parties' experts agreed that thermogenic gas emanates from a petroleum source. And, all three experts plotted the gas in Mr. Kiskadden's well as carbon dioxide reduction, and *not* as thermogenic. Where they differed was the source of the carbon dioxide reduction gas in Mr. Kiskadden's well. Whereas the Department and Range's experts believe carbon dioxide reduction gas to be produced at the surface, Dr. Sommer believes that carbon dioxide reduction gas is deep seated. He testified that both thermogenic gas and carbon dioxide reduction gas have a deep seated source.

However, contrary to the assertion in the Appellant's post hearing brief, none of the experts, including Dr. Sommer, testified that the gas in Mr. Kiskadden's well was "thermogenic." The Appellant states in his post hearing brief that "'thermogenic' gas refers to gases that emanate from a petroleum source or as a result of carbon dioxide reduction" and that "the methane in Mr. Kiskadden's water derives from a thermogenic, deep-seated gas." (Appellant's Post Hearing Brief, p. 217) Those statements contradict the testimony of the Appellant's own expert, who did not testify that the gas in Mr. Kiskadden's well was thermogenic.

We found Dr. Sommer's testimony to be forthright, credible and well explained. However, the Appellant relies on Dr. Sommer's testimony for conclusions that he did not reach.

For example, although he concluded that both the gas in Mr. Kiskadden's well and the production gas in Range's well were deep seated, he did not testify that Range was the source of the gas in Mr. Kiskadden's well. In plotting the gas from Range's well and the gas detected in Mr. Kiskadden's well, he testified that they were "indicative of deep seated gases" but "distinctly different." (T. 2792) The most he concluded was that both gases were deep seated. (*Id.*) Whereas he testified that the gas in Mr. Kiskadden's well was carbon dioxide reduction, he concluded that Range's production gases were thermogenic in nature. (T. 3119) The Appellant argues that although the two gases plot differently, they can still be from the same source due to isotopic fractionation which theorizes that as gases move they become fractionated. However, although Dr. Sommer did testify that it was his expert opinion that the gas in Mr. Kiskadden's well was due to hydraulic fracturing, he stated he had no reason to believe that the gas in Mr. Kiskadden's water well had any relationship to the gas at Range's production well. (T. 2794) He further testified that it was his expert opinion that the ethane found in Mr. Kiskadden's water supply came from a different source than the ethane generated by Range's Yeager production. (T. 3125)

The Importance of Chloride Levels

The Appellant argues that the Department erred by focusing solely on the level of chlorides in Mr. Kiskadden's water without focusing on the presence of other parameters. The Department's determination letter states in relevant part as follows:

Gas well waste fluids are high in many parameters, including sodium and [total dissolved solids]. However, they characteristically show the highest concentration in chloride, usually 2-3 times that of sodium. Your water supply shows a chloride concentration of between 33 and 44 mg/l, or about 1/8 of the sodium level. *This fact alone largely rules out gas well contamination at your well.*

(DEP Ex. 13) (emphasis added).

Mr. Kiskadden points out that, whereas the composition of flowback water might consist of high levels of chloride in comparison to sodium levels, not all of the releases at the Yeager site involved flowback water. Mr. Kiskadden further points out that releases also occurred from the drill cuttings pit and that soil samples beneath the drill cuttings pit contained higher amounts of sodium in comparison to chloride. Therefore, argues Mr. Kiskadden, the fact that his well contains higher levels of sodium in comparison to chlorides could be an indication that it was polluted by a release from the drill cuttings pit.

We agree with Mr. Kiskadden that the ratio of chloride to sodium should not be the sole factor in determining whether his water supply was impacted by gas related operations. Of particular note, the Department maintains a list of predrill parameters that it recommends to homeowners prior to gas well drilling taking place in their area. The Department recommends that homeowners test their water for a list of various parameters within one year prior to gas well drilling. The list includes a number of organics, inorganics and trace metals. If a homeowner cannot test for the entire package of parameters, the Department recommends a shortened list that at a minimum should be tested. At the time of Mr. Kiskadden's appeal, chloride was not on the minimum list of parameters to be tested. (F.F. 122) In fact, chloride was not added to the list until 2014, following the onset of Mr. Kiskadden's appeal before the Board. Clearly, if the Department did not consider chloride to be an essential parameter for which to test, it would be improper to base its determination of gas well-related impact on this one parameter.

We find, however, that the Department did not base its determination solely on the chloride-sodium ratio. Rather, it also investigated the hydrogeology of the area and sampled for other constituents. The chloride-sodium ratio is one of many pieces of evidence presented at the

trial in this matter. And while the chloride-sodium ratio should not be the sole basis for concluding that Mr. Kiskadden's water was not impacted by Range's operation, it is nonetheless an important piece of the puzzle. If sodium from gas-related waters made it to Mr. Kiskadden's well, then chlorides would have been present in much higher concentrations.

Mr. Kiskadden points to soil samples collected from underneath the drill cuttings pit as evidence that high levels of sodium are indicative of pollution from the Yeager site. He points out that in nearly all of the soil samples taken from underneath the drill cuttings pit, the sodium concentrations were higher than chloride concentrations. However, all of the experts testified that chlorides are more mobile than sodium. A higher concentration of sodium in the soil indicates that the sodium stayed in the soil while the chlorides moved with the fluids through the soil. As such, the Department is correct that one would expect a higher concentration of chlorides in Mr. Kiskadden's water. As noted earlier, although the level of chlorides cannot be the only factor in determining whether there has been an impact on Mr. Kiskadden's water from Range's operations, it is nonetheless an important factor. The high levels of sodium and low levels of chloride in the soil beneath the drill cuttings pit reinforce the Department's position that chlorides would have traveled to Mr. Kiskadden's well if it had been impacted by contamination traveling from the Yeager site.

Background Water Quality Levels

Unfortunately, there are no predrilling samples of Mr. Kiskadden's water from which background water quality can be determined. In order to avoid liability under the rebuttable presumption set forth in the 1984 Oil and Gas Act, which was in effect at the time the Department investigated Mr. Kiskadden's complaint, a gas well operator would have been required to conduct predrill sampling for water supplies within 1,000 feet of a gas well. Mr.

Kiskadden's well is 2,900 feet or approximately one half of a mile from the Yeager site.¹² Therefore, we have no way of knowing the exact quality of Mr. Kiskadden's water prior to the start of operations by Range.¹³

Mr. Kiskadden asserts that predrill samples for the Yeager springs and Puskarich springs are an appropriate comparison for background water quality data for his well. The Yeager springs are located on property owned by Ron and Sharon Yeager and are situated northwest of Range's Yeager operation. (Range Ex. 222) The Puskarich springs are south of the Yeager site. (Range Ex. 222) Both are situated on hillsides. Predrilling, the springs exhibited low levels of chlorides, sodium and total dissolved solids, and pH levels in the normal range. Mr. Kiskadden asserts that the predrilling quality of his water would have been comparable to the predrill samples of the Yeager and Puskarich springs.

However, hillside springs and valley wells are hydrogeologically different. Water flowing from a spring has a shorter residence time, i.e., the amount of time it has been in contact with rock formations. Because of its shorter residence time, water from a spring is likely to be less mineralized than water from a well which has a longer residence time. In contrast to the Yeager and Puskarich hillside springs, Mr. Kiskadden's well is hundreds of feet deep in a stream valley. As a result it intercepts multiple rock formations that affect its quality. (F.F. 131-135)

The Department and Range contend that a more appropriate comparison for purposes of background water quality is the water well of Mr. Kiskadden's mother, Grace Kiskadden. Her well is approximately 1,000 feet northwest and upstream of Mr. Kiskadden's well and intercepts the same rock formations as Mr. Kiskadden's well. According to the Department, Mrs.

¹² Predrill sampling would not have been required under the current law either, which expanded the distance for the rebuttable presumption to 2,500 feet.

¹³ A predrill sample of Mr. Kiskadden's well would have helped tremendously in this matter and doubtless would have resulted in a shorter and more efficient trial and pretrial schedule.

Kiskadden's well is hydrogeologically separated from the Yeager site by a ridge that runs between her well and the drainage area for the Yeager site, and for this reason it serves as an example of water that has not been impacted by Range's operations at the Yeager site. Mrs. Kiskadden's water shows similar characteristics to that of Mr. Kiskadden: high sodium and total dissolved solids, elevated pH and lower chloride concentration. (T. 1883-84; DEP Ex. 30) Both wells also show calcium and alkalinity in the same ranges. (T. 1883; DEP Ex. 30)

Mr. Kiskadden disputes that his mother's water is hydrogeologically separated from the Yeager site, and he contends that her water has also been contaminated by Range's operations. According to Mr. Kiskadden, the fact that his mother's water contains a similar profile to his only verifies that her water has also been polluted. He disputes the Department's contention that a ridge separates Grace Kiskadden's water supply from the Yeager site since the Department did not conduct a hydrogeologic investigation of Mrs. Kiskadden's water supply and its connection or lack thereof to the Yeager site.

Even if we were to accept Mr. Kiskadden's assertion that without a hydrogeologic investigation we cannot be certain that Grace Kiskadden's well is hydrogeologically separated from the Yeager site, the background water quality of the area appears to be quite similar to Mr. Kiskadden's. Mr. Kiskadden's water supply is a relatively deep well located in a valley setting. As such, it is inappropriate to assume that it would have the same water chemistry as a spring, such as the Yeager or Puskarich springs, or even a well located on a hilltop or hillside. Water type signature is affected by topographic location. Ms. Perry explained that springs located on hillsides and hilltops in southwestern Pennsylvania tend to be calcium bicarbonate water type while wells in valleys tend to be sodium bicarbonate type. Groundwater data for southwestern

Pennsylvania confirms this conclusion. Therefore, it is unlikely that Mr. Kiskadden's water quality was ever similar to the predrill samples for the Yeager and Puscarich springs.

The Appellant produced hundreds of pages of sampling results showing that numerous parameters had been detected in Mr. Kiskadden's water that were also detected in sampling at the Yeager site. The problem is that most of those parameters can also be found naturally in groundwater. Thus, their mere detection in a sample is not enough to prove a hydrogeologic connection. Those that are not found naturally in groundwater are also associated with products and activities unrelated to hydraulic fracturing operations. As noted earlier, Mr. Kiskadden admitted to disassembling vehicles on or near his property and draining their fluids, cutting up vehicles and appliances with an acetylene torch, and storing vehicles on his property. A salvage yard was operated for decades adjacent to his property. He also testified that he did no maintenance on his well prior to his complaint. In fact, when he replaced the well pump in the Spring of 2013 he testified that it was covered with a hard brown build up. We cannot ignore these factors in reaching our decision.

Interestingly, none of the parties, including the party with the burden of proof, the Appellant, introduced any water sampling more recent than March 27, 2012 for Mr. Kiskadden's well. More current information would have been helpful and relevant. As stated in *Rail Road Action, supra* at 476, because no appealed action of the Department is final until it has been ruled on by the Board, "any evidence generated up until *now* is potentially relevant." (emphasis in original). It also would have been extremely helpful to see the results of more extensive water sampling for the wells and springs on properties located between the Yeager site and Mr. Kiskadden's property – i.e., the Haney, Voyles, Bennett and Garrett water supplies. The record contains limited sampling results for the Voyles and Haney water supplies from November 2010

and February 2011. Range attempted to introduce more extensive sampling results, but they were excluded from evidence based on the Appellant's objection that they had not been produced in discovery. Although the sampling results were produced in discovery in related litigation in the Court of Common Pleas of Washington County, they were not produced in this case by Range and, therefore, we had no choice but to exclude this information from the record. Had this information been admissible, it would have helped to develop a more complete picture of groundwater movement in the area.

Strontium Analysis

EPA's March 27, 2012 testing of Mr. Kiskadden's water well included an analysis of strontium isotopes. (DEP Ex. 15) The ratio of Strontium 87 to Strontium 86 can be used to determine the age of water. Mr. Rubin testified that the strontium ratio for Mr. Kiskadden's water indicates that it is old water which would have come from depths where gas is produced. However, the strontium ratio for Mr. Kiskadden's water falls outside the range for water from the gas producing formations at issue in this case, the Marcellus Shale and the Upper Devonian Shale. On cross examination, Mr. Rubin admitted that the strontium value for Mr. Kiskadden's water did not fall within the ranges for the Marcellus Shale and Upper Devonian Shale but fell within the value for the Pittsburgh Coal Seam. (T. 3451, 3857)

Organic Compounds

Low concentrations of acetone, t-butyl alcohol and chloroform were reported in the Department's August 1, 2011 sampling. Those constituents were not reported when EPA tested the water on March 27, 2012, although EPA's testing did indicate the presence of diesel range organics. (DEP Ex. 15) The Department's Mr. Eichler testified that such low concentrations of organic compounds would not be unexpected in private water supplies, especially given the

proximity of Mr. Kiskadden's property to the auto salvage yard and Banetown Road. The presence of these constituents in his water could reflect background conditions, surface runoff or impact from the adjacent salvage yard. Chloroform, in particular, could be due to Mr. Kiskadden adding bleach to his well after the Department's testing revealed the presence of coliform bacteria.¹⁴ Additionally, acetone was found to be present in a field blank sample that was taken for the purpose of ensuring that the presence of any constituents found in Mr. Kiskadden's water was not due to field contamination. The presence of acetone in the field blank sample raises at least some doubt as to whether acetone was truly present in Mr. Kiskadden's well.

The sporadic presence of low concentrations of organic compounds in Mr. Kiskadden's water supply does not contradict the Department's finding that gas-related activities have not contaminated Mr. Kiskadden's well, especially given his location adjacent to an auto salvage yard and his admission that he has disassembled and drained fluids from vehicles on his property. As we have noted, the Appellant has not established a hydrogeologic connection between Range's operation and his water well. He has not convinced us that his water evidences the effects of pollution by gas well activities. In short, the evidence presented by the Appellant does not meet his burden of proof.

Timing of Department's Determination

Mr. Kiskadden asserts that he should prevail because the Department did not make a determination on his water supply complaint within 45 days, as required under Section 208 of the 1984 Oil and Gas Act, 58 P.S. § 601.208(b), and Section 78.51 of the Oil and Gas regulations, 25 Pa. Code § 78.51(c).¹⁵ Mr. Kiskadden telephoned his complaint to the Department on or about June 3, 2011. Subsequently, the Department conducted water sampling on June 6, 2011 and

¹⁴ Mr. Kiskadden testified that he did not dilute the bleach before adding it to the well.

¹⁵ The 45 day requirement is also contained in Section 3218(b) of the current Oil and Gas Act, 58 Pa. C.S. § 3218(b).

August 1, 2011; conducted a hydrogeologic investigation during that timeframe; and issued its determination on September 9, 2011, approximately 90 days after being notified of the complaint.

Although the Oil and Gas Act calls on the Department to make a determination within 45 days of being notified of a water supply complaint, neither the Act nor the implementing regulations provide for deemed approval should the Department fail to act within that timeframe. The Act provides no penalty for a determination that is issued after the 45 day deadline.

In the case of Mr. Kiskadden's water supply complaint, the record shows that the Department acted promptly to investigate his complaint, that it conducted a thorough investigation consisting of water sampling and a hydrogeologic study of the area, and that it issued a decision promptly after receiving the results of the water sampling and hydrogeologic investigation. Although the determination was not issued within 45 days, the Department was not dilatory in conducting its investigation and in reaching a determination on whether Mr. Kiskadden's well had been polluted by Range's operation.

The Commonwealth Court has held, "Generally, a statute requiring a public official to take action within a specific time frame is directory unless the statute indicates it is mandatory or time is of the essence for the action that the statute requires." *JPay, Inc. v. Department of Corrections*, 89 A.3d 756, 763 (Pa. Cmwlth. 2014) (citing *In re Sale of Real Estate by Lackawanna County Tax Claim Bureau*, 22 A.3d 308, 314 (Pa. Cmwlth. 2011); *see also, Department of Transportation, Bureau of Driver Licensing v. Claypool*, 618 A.2d 1231, 1232 (Pa. Cmwlth. 1992)). One indication of whether a timeframe in a statute was intended to be mandatory is whether the statute specifies some consequence of failure to follow it or indicates that time is of the essence. Here, the statute specifies no consequence of failing to issue a

determination within 45 days. While we recognize that directory provisions of the legislature, just like mandatory provisions, are meant to be followed, a failure to strictly adhere to the timeframe set forth in a directory provision of a statute does not invalidate the action involved.

JPay, supra.

Second Complaint

Mr. Kiskadden asserts that the Department failed to issue a determination on a second complaint filed by him in January 2012 and that this failure has deprived Mr. Kiskadden of the right to notice of the Department's findings and the right to be heard. The record contains very little information on this second complaint, or whether a complaint was, in fact, lodged. According to the record, Mr. Kiskadden's counsel placed a telephone call to the Department which resulted in additional sampling of Mr. Kiskadden's water on January 26, 2012. Whether this telephone call reached the level of a complaint is unclear. The Department asserts that the issue is nonetheless waived because Mr. Kiskadden did not include it in his prehearing memorandum. 25 Pa. Code § 1021.104; *Borough of St. Clair v. DEP*, EHB Docket No. 2013-118-L (Adjudication issued May 20, 2015), *slip op.* at 18.

Even if the January 2012 telephone call by Mr. Kiskadden's counsel to the Department served as a complaint, we reject his argument that the Department's inaction on the second complaint deprived him of the opportunity to appeal the Department's determination and be heard on it. The results of the Department's January 26, 2012 sampling were introduced in this proceeding and have been considered by the Board. Mr. Kiskadden has not shown us that his second complaint involves anything that was not addressed in this proceeding.

To comport with due process, states must provide persons with a meaningful opportunity to be heard before depriving them of life, liberty, or property. *Brockway, supra* at 26 (*citing*,

Jake v. DEP, 2014 EHB 38, 50). A hearing before this Board provides Mr. Kiskadden that opportunity. *Kiskadden v. DEP*, 2013 EHB 21, 25. The Appellant had the opportunity to conduct discovery, and, in fact, conducted robust discovery. His counsel extensively deposed Department witnesses, presented the Appellant's objections to this Board, and cross-examined the Department and Range's witnesses. His right to due process has clearly been satisfied. *Brockway, supra* at 27; *Kiskadden v. DEP*, 2014 EHB 642, 643-44. Therefore, we reject Mr. Kiskadden's argument that his due process rights have been violated by the Department's alleged failure to act on his second complaint.

Conclusion

We are aware of the fact that this is the first case to proceed to hearing involving a claim that unconventional gas drilling operations contaminated a homeowner's water well. As set forth in our Adjudication, after a careful review of all the evidence we find that the Appellant did not prove his case by a preponderance of the evidence. This case was extremely hard fought. Counsel represented their clients zealously at trial and we are appreciative of their efforts

In the end, the Appellant's case was hurt by several factors. First, he had no predrilling samples to show the quality of his water prior to Range's drilling operations. This, in and of itself, is not necessarily fatal, but the absence of such water samples made his case more difficult to prove. Second, the Appellant simply did not introduce the necessary factual testimony, lab results, or expert testimony to carry his burden of proof and prove his case by a preponderance of the evidence. Candidly, Appellant did not help his case by his own testimony. His memory was poor and his testimony was thin.

The physical facts showed that his water well was located adjacent to a salvage yard with numerous automobiles and other solid waste product on the grounds over the years. The

Appellant never performed any maintenance on his water well or on his septic system. When the water pump inside his well stopped working and was removed, the Appellant's own testimony describing the water pump vividly highlights this lack of maintenance. Pictures of his water well show a well open to the elements and not properly maintained.

The Appellant's hydrogeology expert testified in a conclusory manner and his "shotgun" approach to what caused the contamination was not persuasive based on the evidence he relied on. The scores of lab results introduced into evidence by the Appellant did not support the theory that his well was contaminated by Range's operations. As we explained, high chloride readings can be a good indicator that drilling operations have contaminated a water source. For example, it is undisputed that the Yeager Springs were contaminated by Range's drilling operations, and the chloride readings in the samples taken from the Yeager Springs were in the thousands. In contrast, the chlorides in Mr. Kiskadden's water well never exceeded 44 mg/l.

Although the Pennsylvania Department of Environmental Protection's investigation was not perfect, it was robust. The Department took multiple samples and conducted a thorough investigation. Its professional staff presented strong testimony setting forth what they did and how their opinions were formed.

Simply because there are problems on a drilling site, and there certainly were many problems on this site as we have set forth in our Adjudication, it does not mean that a water well located approximately one half mile away was impacted by those drilling operations. The homeowner must show by a preponderance of the evidence that any pollution to his water well is caused by the drilling operations, and the Appellant failed to do that here.

CONCLUSIONS OF LAW

1. Section 208 of the 1984 Oil and Gas Act and Section 3218 of the current Oil and Gas Act charge the Department with investigating claims of pollution to water supplies by oil and gas activities. 58 P.S. § 601.208 (superseded by 58 Pa. C.S. § 3218).

2. When the Department conducts an investigation of a water supply complaint pursuant to the provisions of Pennsylvania's Oil and Gas Act and makes a determination that the oil and gas company's activities have not affected a water supply, that determination is a final action of the Department which is appealable to the Pennsylvania Environmental Hearing Board (Board). Environmental Hearing Board Act, Act of January 13, 1988, P.L. 530, *as amended*, 35 P.S. § 7511 *et seq.*

3. The Appellant bears the burden of proving by a preponderance of the evidence that the Department erred in determining that Range's operations had not contaminated his water supply. 25 Pa. Code § 1021.122(a); *Kiskadden v. DEP*, 2014 EHB 667.

4. The Board's review is *de novo*. *Warren Sand & Gravel, supra*; *O'Reilly, supra*; *Smedley, supra*. This means that the Board is not limited to information that may have been available to the Department at the time it reached its determination. *Smedley v. DEP*, 2001 EHB at 156.

5. Since we are deciding this matter on the merits, we need not address Range's motion for directed adjudication. *Winner v. DEP*, 2014 EHB at 1024; *Krushinski*, 2008 EHB at 581.

6. Because no appealed action of the Department is final until it has been ruled on by the Board any evidence generated up until the time of trial is potentially relevant. *Rail Road Action*, 2009 EHB at 476.

7. Although Section 208 of the 1984 Oil and Gas Act (and Section 3218(b) of the current Act) require the Department to make a determination on a water supply contamination complaint within 45 days of being notified of the complaint, neither the statute nor the regulations provide for deemed approval should the Department fail to act within 45 days. 58 P.S. § 601.208(b); 25 Pa. Code § 78.51(c).

8. “Generally, a statute requiring a public official to take action within a specific time frame is directory unless the statute indicates it is mandatory or time is of the essence for the action that the statute requires.” *JPay, supra*, 89 A.3d at 763.

9. To comport with due process, states must provide persons with a meaningful opportunity to be heard before depriving them of life, liberty, or property. *Brockway, supra* at 26. A hearing before the Environmental Hearing Board, in which the Appellant was able to present evidence not only pertaining to the Department’s September 9, 2011 determination letter but also to the Appellant’s alleged second complaint in January 2012, provides the Appellant with due process to be heard on his claims. *Kiskadden v. DEP*, 2013 EHB at 25.

10. Mr. Kiskadden did not demonstrate by a preponderance of the evidence that a hydrogeological connection exists between his water well and Range’s operations at the Yeager site.



COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL HEARING BOARD



LOREN KISKADDEN :
v. : **EHB Docket No. 2011-149-R**
COMMONWEALTH OF PENNSYLVANIA, :
DEPARTMENT OF ENVIRONMENTAL :
PROTECTION and RANGE RESOURCES - :
APPALACHIA, LLC, Permittee :

ORDER

AND NOW, this 12th day of June, 2015, it is hereby **ORDERED** that the Appeal filed by Mr. Loren Kiskadden at EHB Docket No. 2011-149-R is dismissed.

ENVIRONMENTAL HEARING BOARD

s/ Thomas W. Renwand
THOMAS W. RENWAND
Chief Judge and Chairman

s/ Michelle A. Coleman
MICHELLE A. COLEMAN
Judge

s/ Bernard A. Labuskes, Jr.
BERNARD A. LABUSKES, JR.
Judge

s/ Richard P. Mather, Sr.
RICHARD P. MATHER, SR.
Judge

s/ Steven C. Beckman

STEVEN C. BECKMAN
Judge

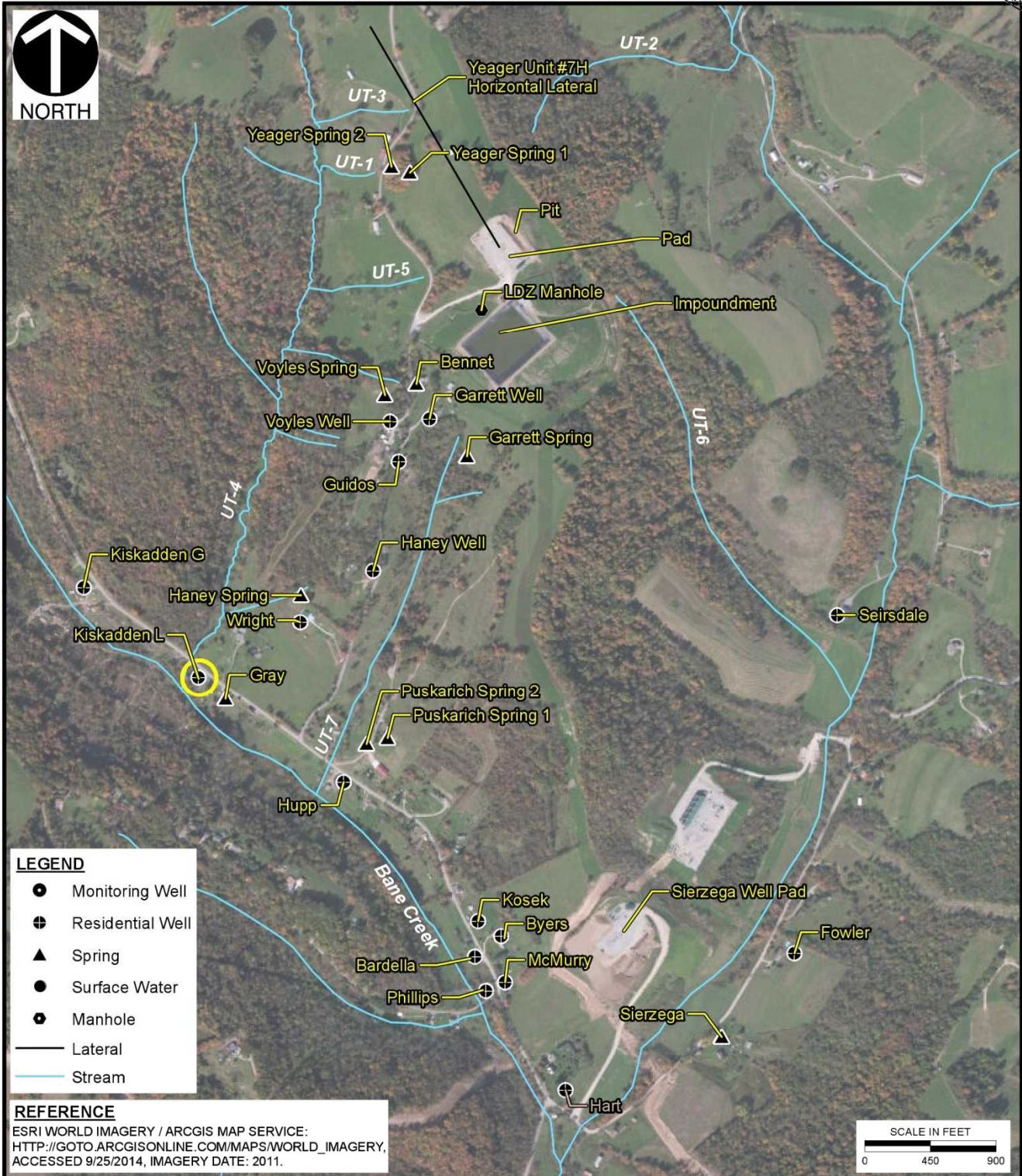
DATED: June 12, 2015

c: DEP, General Law Division:
Attention: Maria Tolentino
(via *electronic mail*)

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Richard T. Watling, Esquire
(via *electronic filing system*)

For Appellant:
Kendra L. Smith, Esquire
John M. Smith, Esquire
Jennifer Schiavoni, Esquire
(via *electronic filing system*)

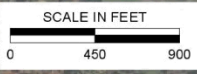
For Permittee:
John K. Gisleson, Esquire
Kenneth Komoroski, Esquire
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Steven E. H. Gibbs, Esquire
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Dennis St. J. Mulvihill, Esquire
Bruce E. Rende, Esquire
Erin J. Dolfi, Esquire
(via *electronic filing system*)




LEGEND

- Monitoring Well
- ⊕ Residential Well
- ▲ Spring
- Surface Water
- ⊙ Manhole
- Lateral
- Stream

REFERENCE
ESRI WORLD IMAGERY / ARCGIS MAP SERVICE:
[HTTP://GOTO_ARCGISONLINE.COM/MAPS/WORLD_IMAGERY](http://gto.arcgis.com/maps/world_imagery),
ACCESSED 9/25/2014, IMAGERY DATE: 2011.



Document Path: P:\201313132-858-GIS\Maps\132858_Spring_Well_Locations_85x11_20140924.mxd

 Civil & Environmental Consultants, Inc. 333 Baldwin Road - Pittsburgh, PA 15205-9072 412-429-2324 · 800-365-2324 www.cecinc.com		RANGE RESOURCES-APPALACHIA, LLC. WATER QUALITY MONITORING LOCATIONS AMWELL TOWNSHIP, WASHINGTON COUNTY, PA	
		YEAGER DRILL SITE AND SURROUNDING AREAS	
DRAWN BY: CLC DATE: 9/24/2014	CHECKED BY: CBM SCALE: 1" = 900'	APPROVED BY: ^{* Hand signature on file} JP* PROJECT NO: 132-858.0001	FIGURE NO: 1 Exhibit RR-222