



# RAILROAD COMMISSION OF TEXAS

## HEARINGS DIVISION

**OIL & GAS DOCKET NO. 08-0288050**

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**THE APPLICATION OF MANHATTAN PETROLEUM, INC., PURSUANT TO STATEWIDE RULE 9, FOR A COMMERCIAL PERMIT TO DISPOSE OF OIL AND GAS WASTE BY INJECTION INTO A POROUS FORMATION NOT PRODUCTIVE OF OIL OR GAS, 87 FAIRVIEW SWD LEASE, WELL NO. 1, SPRABERRY (TREND AREA) FIELD, HOWARD COUNTY, TEXAS.**

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**HEARD BY:** Brian Fancher, P.G. – Technical Examiner  
Marshall F. Enquist – Hearings Examiner

**APPEARANCES:**

**APPLICANT:**

Matthew Baab  
James M. Clark, P.E.  
Michael Grella

**REPRESENTING:**

Manhattan Petroleum, Inc.

**PROTESTANTS:**

Glenn E. Johnson  
Bud Holmes  
Thomas H. Richter, P.E.

Athlon Holdings, L.P.

**PROCEDURAL HISTORY**

Application Published:	October 18, 2013 & May 15, 2014
Application Filed:	October 16, 2013 & February 21, 2014
Protest Received:	October 22, 2013
Request for Hearing:	March 20, 2014
Notice of Hearing:	April 17, 2014 & May 20, 2014
Date of Hearing:	June 10, 2014
Transcript Received:	July 7, 2014
Record Closed:	August 14, 2014
Proposal For Decision Issued:	November 11, 2014

**STATEMENT OF THE CASE**

This is the application of Manhattan Petroleum, Inc. (“Manhattan”) (Operator No. 524391), pursuant to Statewide Rule 9 [16 Tex. Admin. Code §3.9] for a commercial permit to dispose of oil and gas waste by injection into a porous formation not productive of oil or gas in its proposed 87 Fairway SWD Lease, Well No. 1, Spraberry (Trend Area) Field, Howard County, Texas. The subject well has not been drilled, and its proposed location is about ten miles northwest of Big Spring, Texas in Howard County. The subject application centers on Manhattan’s request to permit the San Andres Formation from 3,000 feet to 4,600 feet, at the well’s proposed location, for commercial disposal of produced saltwater and RCRA-Exempt Oil and Gas Wastes<sup>1</sup> at a maximum daily injection volume of 20,000 barrels of liquid per day at a maximum surface injection pressure (“MSIP”) of 1,500 pounds per square inch (“psi”).

Pursuant to Statewide Rule 9, notice of the subject application was made to the surface owners of the subject tract, all adjacent surface owners to the subject tract, operators within a 1/2-mile distance from the well, and the Howard County Clerk in Carrizo Springs on October 16, 2013. Notice of the application was published in the *Big Spring Herald*, a newspaper of general circulation in Howard County, Texas, on October 18, 2013 and May 15, 2014. The application was protested by Athlon Energy Operating, Inc., now Athlon Holdings, L.P., (“Athlon”).

The hearing was held on June 10, 2014. At the hearing, Manhattan and Athlon appeared and presented evidence through presentations of direct case, direct cross-examination, rebuttal case, and cross-examination (rebuttal). The record consists of over 75 exhibits, and written closing arguments were presented by the parties following the hearing. The record was closed on August 14, 2014.

**APPLICATION HISTORY**

On October 16, 2013, Manhattan submitted its original application for the subject well, which included the following: (1) injection interval from 3,908 feet to 4,924; (2) maximum daily injection volume of 20,000 barrels per day, with the estimated average daily volume of 16,000 bpd; and, (3) maximum surface injection pressure at 2,250 pounds per square inch gauge, with the average injection pressure of 1,500 psig.

On October 31, 2013, the application was protested by Lonnie Newton, an adjacent surface owner immediately to the east of the subject tract. On November 13, 2013, the Commission received a letter from Newton withdrawing his/her protest. On October 22, 2013, Athlon submitted its letter of protest to the subject application. On March 13, 2014, the Commission’s Underground Injection Control (UIC) Group informed Manhattan that the subject application was administratively

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<sup>1</sup> Resource Conservation and Recovery Act: Examples of RCRA-exempt oil and gas waste include, but are not limited to, produced water, drilling fluids, frac flowback fluids, rigwash and workover wastes.

complete, and that it was under active protest. By letter dated March 20, 2014, Manhattan's counsel requested a hearing on the application.

On February 21, 2014, Manhattan submitted an amended application for the well, which relocated its originally proposed location further west by 1,073 feet<sup>2</sup>. On March 21, 2014, the UIC issued a memorandum to the Commission's Administrative Applications Group which outlined Manhattan's subject application and request for hearing. On April 17, 2014, a Notice of Hearing (NOH) was issued on the captioned docket. On May 14, 2014, Manhattan submitted electronic correspondence to the Commission's Docket Services requesting that the original NOH be amended, and accordingly re-issued. Manhattan's application amendments included: (1) raising the proposed injection interval to 3,000 feet; (2) removing the Clearfork Formation as a named geologic unit within the proposed injection interval; (3) lowering the MSIP to 1,500 psi; and (4) adding three additional persons/entities to the existing Service List. On May 15, 2014, Manhattan published its amended application in the *Big Spring Herald*, a newspaper of general circulation in Howard County, Texas. On May 16, 2014, Manhattan submitted a revised Form W-14 accurately reflecting the mentioned application amendments. Accordingly, the amended NOH was issued on May 20, 2014.

On June 2, 2014, Athlon's counsel submitted a Motion for Continuance (MFC) in the captioned docket. Manhattan's reply to Athlon's MFC was received the same day. On June 3, 2014, Athlon's MFC was denied by the examiners.

At the hearing, Manhattan further amended its application by requesting to raise the base of its proposed injection interval from 4,923 feet to 4,600 feet (Tr., Pg. 20, L. 8). Operationally, Manhattan requests that the subject well be permitted to provide for the following:

1. Commercial disposal of salt water and RCRA-exempt<sup>3</sup> waste into the San Andres formation in the depth interval from 3,000 feet to 4,600 feet;
2. The maximum daily injection volume will be 20,000 barrels per day (bpd).
3. The average daily injection volume will be 16,000 bpd.
4. The maximum surface injection pressure will be 1,500 psig.
5. The average surface injection pressure will be 1,500 psig.

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<sup>2</sup> Compare W-14 dated 10-10-13, Item No. 12 with W-14 dated 02-21-14, Item No. 12.

<sup>3</sup> Resource Conservation and Recovery Act: Examples of RCRA-exempt oil and gas waste include, but are not limited to, produced water, drilling fluids, frac flowback fluids, rigwash and workover wastes.

**DISCUSSION OF THE EVIDENCE**

**Applicant's Evidence (Manhattan)**

Clark's Supporting Testimony

Mr. James Clark, P.E., a consulting petroleum engineer, testified as an expert in petroleum engineering on behalf of Manhattan (Pg. 17, L. 10).

The Well

The subject well has not been drilled, and its proposed location is on a 4.5-acre tract in the northeast corner of Section 48 of Howard County's T&P RR Co. Survey, Block 33, Township 2 North (Pg. 33, L. 4). Manhattan proposes the well be drilled and completed in the following manner<sup>4</sup>:

1. **Surface-casing string:** 9-5/8" set from surface to 400 feet; 300 sacks of cement; circulate cement to surface; drill-hole size of 12-1/4".
2. **Production-casing string:** 7" set from surface to 5,006 feet with 2,350 total sacks of cement; DV tool at 3,700 feet with 2,650 sacks of cement; cement circulated to surface; drill-hole size of 8-3/4".

Mr. Clark asserted that because the base of the proposed injection interval has changed to 4,600 feet, Manhattan would likely not drill deeper than the production casing-shoe (5,006 feet). Mr. Clark testified that all disposal into the proposed injection interval would be through tubing and packer, with the packer set at 3,400 feet below the surface (Pg. 30, L. 10).

Areas of Review (AOR)

Pursuant to Statewide Rule 9, the AORs are centered on the subject well's proposed location. Mr. Clark concluded that there are no wellbores or other artificial penetrations within the 1/4-mile AOR (Pg. 22, L. 15). However, there are two wellbores within the 1/2-mile AOR: (1) Patriot Resources, Inc.'s ("Patriot Resources") Callie "42-A" Lease, Well No. 1 (API No. 42-227-34928) (the "Callie 42A Well"); and (2) Element Petro Operating II, LLC's ("Element Petro") Garrett-Reed Unit 37-38, Well No. 4H (API No. 42-227-37722) (the "Garrett Well").

Patriot Resources's Callie 42A Well is located about 2,100 feet northwest of the subject well, and was drilled to a total depth of 9,000 feet. Furthermore, the Callie 42A Well was plugged and abandoned on 8/16/1995, pursuant to the governing plugging rules at the time.

Element Petro's Garrett Well is a horizontal well that traverses through the 1/2-mile AOR. However, Mr. Clark testified that no part of the Garrett well penetrates the proposed injection interval within the 1/2-mile AOR (Pg. 23, L. 11).

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<sup>4</sup> Manhattan Exh. Nos. 4 and 13.

Manhattan conducted a review of all wells of record within two miles of the subject well to show the reported historic production within the area. In summary, all production within two miles is deeper than the requested injection interval (3,000 feet to 4,600 feet) (Pg. 27, L. 15). Mr. Clark indicated that one well, the W.D. Bigony Lease, Well No. 1-A (API No. 42-227-32320) (the “Bigony 1A Well”), was mistakenly placed in the Varel (San Andres) Field, and that the Bigony 1A Well did not produce from the San Andres Formation, rather the Canyon Formation which is stratigraphically deeper than the proposed injection interval<sup>5</sup>. Mr. Clark testified that the Bigony 1A Well was drilled as a dry hole, and was perforated approximately 2,000 feet below the base of the proposed injection interval. Mr. Clark concluded that the Bigony 1A Well was placed in the Varel (San Andres) Field as a means of convenience (Pg. 29, L. 1).

### Water Protection

On October 19, 2013, the Commission’s Groundwater Advisory Unit (GAU) determined that the base of usable quality water exists 250 feet below ground surface at the subject well’s proposed location. On October 21, 2013, the GAU concluded : (1) that disposal at the originally proposed injection interval (3,908 feet to 4,924 feet) would not endanger the freshwater strata at the well’s proposed location; (2) that the base of usable quality water occurs at 275 feet, rather than 250 feet; and (3) that the base of the usable source of drinking water (USDW) is at roughly 975 feet. On May 30, 2014, Manhattan obtained an updated determination from the GAU, as a result of the mentioned amendments to the application prior to the hearing. The GAU determined that using the well for disposal from 3,000 feet to 4,924 feet would not endanger the freshwater strata in the area of the well<sup>6</sup>.

### Injection Interval

Prior to the hearing, Manhattan’s amended application indicated that it seeks an injection interval in the well from 3,000 feet to 4,924 feet (Tr., Pg. 19, L. 18), which includes the entire San Andres Formation and the upper Clear Fork Formation. At the hearing, however, Manhattan amended the base of its proposed injection interval from 4,924 feet to 4,600 feet because Manhattan seeks only to permit the San Andres Formation for disposal in the subject well. Furthermore, by amending the overall injection interval from 3,000 feet to 4,600 feet, disposal fluids will remain confined to the injection interval (Pg. 20, L. 10 & Pg. 21, L. 11). Mr. Clark contends that Manhattan plans to perforate the well’s production casing at about 3,500 feet, and that injection fluids will not migrate above that elevation (Pg. 21, L. 8).

### Geology

The subject well is located within the well-known Midland Basin. Manhattan’s first structural cross-section is comprised of three well logs taken from three wells where the furthest

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<sup>5</sup> Compare Manhattan Exh. No. 11 with Mr. Clark’s testimony; Tr., Pg. 27-28.

<sup>6</sup> Manhattan Exh. No. 10.

distance between the wells is roughly three miles from west to east<sup>7</sup>. Although Manhattan's ultimately proposed injection interval spans from 3,000 feet to 4,600 feet, the cross-section focuses on the depths ranging from 3,400 feet to 5,500 feet. Mr. Clark testified that the target disposal zone within its proposed injection interval ranges from 3,500 feet to 4,100 feet (the target zone). Moreover, the target zone is continuous in the area of the subject well, exhibits over 15% porosity, and is the interval being used for disposal by all commercial disposal wells throughout the subject well's area (Pg. 32, L. 11).

Manhattan's second structural cross-section includes the easternmost well from its initial cross-section (the Holy Grail 44, No. 1), but extends further east by roughly 1.5 miles and includes Athlon's Clyde 45 Lease, Well No. 1 (API No. 42-227-35055) (the "Clyde 45 Well"). The Clyde 45 Well is permitted as a commercial disposal well in roughly the same interval as the subject well (Pg. 37, L. 11).

Mr. Clark testified that the proposed injection interval is capped by an impervious geologic barrier that prevents disposal fluids in the well from ascending beyond the top of the proposed injection interval (Pg. 21, L. 13; Pg. 38, L. 10; Pg. 52, L. 16). In support of this assertion, Manhattan submitted a mud log copy from Athlon's nearby Callie "42-B" Lease, Well No. 1 (API No. 42-227-35134) (the "Callie SWD well")<sup>8</sup>, located 0.8 miles northeast of the subject well. Based on the mud log for the Callie SWD well, Mr. Clark testified that the top of the San Andres Formation occurs at about 3,020 feet, and that over 500 feet of interbedded anhydrite and shale overlie the San Andres Formation (Pg. 35, L. 10). The interbedded anhydrite and shale make up the confining layer to the injection interval for all of the disposal wells that utilize the San Andres Formation for disposal around the subject well (Pg. 37, L. 23). Furthermore, the base of the proposed injection interval is underlain by several shale series, which create a boundary to disposal fluids (Page 257, L. 14-21).

In conclusion, Manhattan alleges it will confine 100% of the disposal to the San Andres Formation (Pg. 20, L. 10; Pg. 53, L. 3). Mr. Clark contends that Manhattan plans to perforate the well's production casing in the target zone, and that injection fluids will not transgress above that proposed injection interval (Pg. 21, L. 8). Beyond that, Mr. Clark alleges that because Manhattan will only dispose into the middle San Andres Formation, fluids will stay confined within the San Andres Formation.

### Public Interest

First, Manhattan indicated that nine commercial disposal wells (the area wells) surround the subject well, and that the area wells utilize the San Andres formation for disposal<sup>9</sup>.

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<sup>7</sup> Manhattan Exh. No. 14.

<sup>8</sup> Manhattan Exh. No. 15.

<sup>9</sup> Manhattan Exh. No. 17.

Manhattan submitted copies of the commercial disposal permits for each of the area wells which include the following<sup>10</sup>:

	<u>Operator</u>	<u>Well</u>	<u>PII</u>	<u>PMDIV (bbl/d)</u>	<u>D&amp;D</u>
1.	Athlon Holdings	Callie 42-B, # 1**	2758'-3075'	10,000	0.8; NE
2.	Athlon Holdings	Clyde 45, # 1D**	3297'-4970'	10,000	3; E
3.	Hadaway Cons	Lloyd SWD, # 2**	2714'-3122'	8,000	3; W-SW
4.	Wichita Water	Ringneck Dove, # 1**	3100'-6600'	15,000	3; S-SE
5.	Element Petro	Shroyer SWD, # 1**	3908'-4924'	8,000	4; N-NW
6.	Hend. & Erik.	Knott SWD, # 1**	3850'-5832'	20,000	5; NW
7.	Athlon Holdings	Hopper SWD, # 1	3,095'-3,990'	10,000*	7; W
8.	Athlon Holdings	Glass SWD, # 1	3,000'-4,900'	7,500*	10;--
9.	MTN Energy	Crenshaw, # 1**	3,510'-4,400'	20,000	6; S

Collectively, the area wells primarily utilize the San Andres Formation for disposal (Pg. 54, L. 21). The San Andres Formation is a constituent of the overall Spraberry (Trend Area) Field. However, the nearest producing well completed in the San Andres Formation is located over three miles to the west of the subject well (Pg. 53, L. 23). Mr. Clark contends that the subject well's proposed injection interval will not harm any productive oil and gas zone (Pg. 54, L. 3).

Second, Manhattan introduced evidence supporting its contention that there is a need for additional disposal capacity in the area. On February 10, 2012, Athlon issued a letter<sup>11</sup> to Manhattan that states:

Athlon is the current operator of the Callie and Clyde SWD wells, and hereby gives notice that both wells have reached their capacity. Athlon will be forced to suspend disposal of Manhattan's water on or about February 11, 2012. We advise Manhattan to make immediate alternative plans to dispose of its water from all of its wells that dispose into the Clyde or Callie SWD wells.

Since February 20, 2012, the Clyde (API No. 42-227-35055) and Callie SWD (API No. 42-227-35134) wells have been unavailable for disposal to Manhattan (Pg. 65, L. 24). Athlon operates four of the nine area wells, and at the time of the hearing had pending applications with the Commission to increase the MDIV to 15,000 and 10,000 barrels per day for its Hopper SWD, Well No. 1 and Glass SWD, Well No. 1, respectively (Pg. 47, L. 24 & Pg. 48, L. 18). Mr. Clark testified that the Crenshaw, Clyde, and Callie SWD wells are all at capacity because the Crenshaw, Clyde, and Callie SWD wells are unable to inject their permitted maximum daily injection volumes. For instance, the

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<sup>10</sup> In interpreting the chart, the following terms apply: PII denotes permitted injection interval; PMDIV denotes permitted maximum daily injection volume; D&D denotes distance in miles and direction from the subject well; \* denotes changes pending with the RRC (see Athlon's Hopper SWD No. 1 above); and \*\* denotes commercial disposal wells.

<sup>11</sup> Manhattan Exh. No. 30

Crenshaw SWD well is permitted to dispose of 20,000 barrels per day, yet is only disposing of 8,000 to 8,500 barrels per day. The Clyde SWD well is permitted for 10,000 barrels per day, yet it is disposing a maximum of 7,000 barrels per day (Pg. 52, L. 4). Mr. Clark concluded that Athlon's February 10<sup>th</sup> letter to Manhattan, coupled with the fact that several of the area wells are incapable of disposing fluids at their permitted daily maximum volumes, show there is a need for the subject well. Thus, Manhattan has met the public interest bar.

Grella's Supporting Testimony

Mr. Michael Grella, President of Manhattan, testified on behalf of Manhattan's need for the subject well. Mr. Grella has been an operator in the Permian Basin for over 30 years, where Mr. Grella's companies have been responsible for drilling between 500 to 700 wells. Mr. Grella is also a mineral owner in Howard County (Pg. 64, L. 2).

Mr. Grella asserts that drilling in Howard County is on the rise. From January 1 through June 9, 2014, about 244 drilling permits were issued; and, horizontal well drilling has increased within the last year (Pg. 63, L. 8). The amount of water used to complete a lateral well that extends over 1-1/2 miles is roughly 240,000 barrels of water. Mr. Grella testified that he is currently building and permitting an eight to nine mile long pipeline to gather water from operators that cannot dispose of their produced water (Pg. 71, L. 25). Furthermore, based on the number of permitted wells and the drilling activity, the demand for additional capacity will continue to increase. As a result, there is an immediate need for the subject well (Pg 102; L. 20 and Pg.103).

Organization Report (Form P-5)

Manhattan holds a active P-5, which permits it to perform operations as an operator of oil wells under the Commission's jurisdiction. Mr. Grella is the primary officer listed on Manhattan's P-5, which includes adequate financial security in the form of a \$50,000 bond<sup>12</sup>.

**Protestant's Evidence (Athlon)**

Holmes' Supporting Testimony

Mr. Bud Holmes, Vice President of Engineering and Operations for Athlon, testified on behalf of Athlon. Mr. Holmes is an expert in oil and gas drilling, completion, production, and reservoir engineering.

Athlon protests the subject application because it believes (1) the subject well is located too close to Athlon's most productive vertical oil well in Howard County, which creates a risk to the recoverable reserves from Athlon's mentioned well; and (2) the subject well is not needed<sup>13</sup>.

Athlon operates roughly 57,000-acres in Howard County, which includes its development of

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<sup>12</sup> Manhattan Exh. No. 3.

<sup>13</sup> See Athlon Closing Arguments - Page 2.

Commission-designated fields below the San Andres Formation with vertical and horizontal wells (e.g. wells in the Spraberry (Trend Area) Field). Athlon seeks to exploit hydrocarbons within its Howard County acreage from reservoirs below the San Andres Formation. Beginning with the San Andres Formation, the sequence stratigraphy of the subsurface near the subject well includes the following geologic formations: (1) San Andres; (2) Clear Fork; (3) Spraberry; (4) Dean; (5) Wolfcamp; (6) Strawn; (7) Atoka; and (8) Mississippian.

Mr. Holmes contends that while the subject well is on the edge of Athlon's leased acreage in Howard County, it is not on the edge of Athlon's development (Pg. 119, L. 7-11). Furthermore, the subject well is located within close proximity to the Bigony 48 Lease, Well No. 1 ("API No. 42-227-36764) (the "Bigony 48 Well"), Athlon's most prolific producing vertical well<sup>14</sup>.

Mr. Holmes testified that Athlon plans to further develop its Howard County acreage by drilling over 3,000 vertical wells in the next 30 years (Pg. 117, L. 7), as well as plans to drill the Wolfcamp Formation with horizontal wells. However, Mr. Holmes testified that although Athlon operates its own commercial disposal wells around the subject well, Athlon is not in the business of commercial disposal (Page 106, L. 16). Instead, Athlon uses its own disposal system comprised of several of its own disposal wells interconnected by pipelines to give itself more flexibility in disposing of fluids it produces from its own wells.

Athlon alleges overpressurization of the San Andres Formation by existing disposal wells approximately 2-3 miles south of the subject well. Daily drilling reports were submitted for the following production wells:

- Athlon's Zula 1 Lease, Well No. 2 (API No. 42-227-36685) (the "Zula Well");
- Athlon's Williams 18 Lease, Well No. 1 (API No. 42-227-36514) (the "Williams Well"); and;
- Manhattan's Phillips 11 Lease, Well No. 2 (API No. 42-227-36084) (the "Phillips Well")<sup>15</sup>.

In summary, Athlon inferred that the Zula and Williams Wells encountered unnatural subsurface water flow from the San Andres Formation during drilling operations, as a result of nearby disposal wells that utilize the San Andres Formation for disposal<sup>16</sup>. One step further, Athlon concluded that the Phillips Well incurred parted casing and drilling problems due to the San Andres Formation being overcharged as a result of nearby disposal (Pg. 153, L. 13-25 and Pg. 157; L. 11-16).

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<sup>14</sup> Compare Athlon Exh. No. 6 with Transcript, Page 118, L. 22 - Pg. 119, L. 2. Athlon's Exh. No. 6 indicates that the Bigony 48's 24-hour and 30-day potential test results showed 704 and 572 BOED, respectively (Item No. 1 on Exh. No. 6). Item No. 2 on the same exhibit, the King 13, No. 1, shows it was tested in the same manner and reported 905 and 681 BOED, respectively. The King well is also located in Howard County.

<sup>15</sup> Athlon Exh. Nos. 13-16, & 19. The Zula and Phillips wells are located about two miles south of the subject well. The Williams well is located about three miles south of the subject well.

<sup>16</sup> Compare Athlon Exh. No. 14 and Transcript, Page 137, L. 5-11 with Pages 138-139.

Based on the alleged affects of San Andres Formation's overpressurization to the Zula, Williams, and Phillips Wells, Athlon submitted an estimate of potential harm to its reserves as a result of the proposed subject well<sup>17</sup>. Athlon identified 18 potential vertical well locations and 18 - 30 horizontal well locations within a one-mile radius of the subject well. Based largely off assumption, Athlon estimated approximately 13 to 21 million barrels of oil equivalent (MMBOE) are at risk if the subject application is approved (Pg. 157, L. 20 - Pg. 159).

Lastly, Mr. Holmes testified that with regard to the subject application, Athlon has made multiple attempts to compromise with Manhattan. Mr. Holmes stated that Athlon would withdraw its protest in the immediate case if Manhattan would deepen the proposed disposal interval to only the Ellenburger Formation, and/or move the subject well's proposed location one mile north away from Athlon's acreage. Mr. Holmes concluded that while it would cost Manhattan an incremental \$500,000 - \$750,000 to drill the subject well to the deeper Ellenburger Formation, Manhattan could quickly make-up the additional expenses within a few months on a revenue stream (Pg. 163, L. 21-25). Mr. Holmes stated that Athlon has incurred substantially more cost from the existing San Andres Formation disposal wells offsetting its acreage than the \$500,000 - \$750,000 additional drilling expense; thus, inferring that Manhattan should incur additional costs to deepen the subject well's proposed injection interval. Mr. Holmes offered no basis for his conclusion of the additional \$500,000 to \$750,000 expense, nor mentioned whether moving the subject well one mile north or amending the injection interval to the Ellenburger Formation were suitable alternatives for disposal operations. Mr. Holmes testified that he was not aware of any permitted disposal wells in the Ellenburger Formation in Howard County. Instead, the nearest Ellenburger Formation disposal well is located between 30 and 40 miles in a separate county (Pg. 187, L. 3-8).

#### Holmes' Cross-Examination

By January 2012, Athlon concluded that an issue existed with disposal wells in the area of the subject well (*i.e.*, that overpressurization exists in the San Andres Formation as a result of disposal operations)<sup>18</sup>. As a result, Athlon postponed drilling any production well within one mile of a disposal well (Page 171, L. 2). However, it came to light that Athlon drilled and completed the following production wells in the Spraberry (Trend Area) Field after January 2012:

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<sup>17</sup> Athlon Exh. No. 20.

<sup>18</sup> Compare Page 170, L. 21 with Page 133 - 162. Athlon concludes that overpressurization was encountered during the drilling of three production wells (*i.e.*, the Zula, Williams, and Phillips Wells) located within one mile from a saltwater disposal well, which utilized the San Andres Formation for disposal. The result, according to Athlon, was that the overpressurized San Andres Formation prevented the three production wells from reaching their total depths, which ultimately created waste.

	<u>Well</u>	<u>Drilling Dates</u>	<u>Completion Date</u>	<u>IP Test Results</u>
1.	Denton 45, #2	10/29/12-11/8/12	12/13/12	146 BO; 182 MCF; 188 BW
2.	Denton 45, #1	3/8/13-3/16/13	06/07/13	91 BO; 0 MCF; 614 BW
3.	Leonard 46, #1	1/4/13-1/15/13	05/18/13	29 BO; 80 MCF; 384 BW

The Denton 45 Lease, Well No. 2 (API No. 42-227-37204), Denton 45 Lease, Well No. 1 (API No. 42-227-37054), and Leonard 46 Lease, Well No. 1 (API No. 42-227-37300) are located 0.4 miles southeast, 0.5 miles south, and 0.7 miles east of the Clyde SWD Well, respectively. To date, the Clyde SWD Well has disposed of over 5 million barrels of fluids, more than any disposal well in the area (Pg. 169, L. 6-9). Mr. Holmes made no indication whether the Denton No.1, Denton No. 2, or Leonard No. 46 Wells were ever harmed as a result of overpressurization induced from the Clyde SWD Well. In other words, Mr. Holmes contends that the production wells located between two and three miles south of the subject well (*i.e.*, the Zula, Williams, and Phillips Wells) were drilled within one mile of a San Andres Formation disposal well (*i.e.* the Southwest Royalties, J Cross SWD Lease, Well No. 1D (API No. 42-227-34396) (the Cross SWD Well”), and were adversely impacted by the disposal well; notwithstanding that, Athlon drilled three production wells between 0.4 and 0.7 miles of the most active San Andres Formation disposal well in the area with no indication that the wells were harmed or prevented from drilling deeper than their originally targeted productive zones.

When asked by Manhattan’s counsel, “Aside from the H2S levels, do you have any other evidence that disposal into the San Andres caused the air and water flows encountered in these wells [the Zula, Williams, and Phillips wells],” Mr. Holmes replied, “I don’t have evidence, I just have strong correlation...”

Moreover, with regard to the Cross SWD Well, Mr. Holmes testified that he is not familiar with the depths utilized for disposal. While Athlon alleges that the Cross SWD Well is responsible for the San Andres formation overpressurization at the Phillips Well’s location (Pg. 190, L. 17), Mr. Holmes is unaware of the injection depths used for disposal in the Cross SWD Well.

### **EXAMINERS’ OPINION**

Tex. Water Code §27.051 states: (a) the commission may grant an application in whole or part and may issue the permit if it finds:

1. that the use or installation of the injection well is in the public interest;
2. that no existing rights, including, but not limited to, mineral rights, will be impaired;
3. that, with proper safeguards, both ground and surface fresh water can be adequately protected from pollution;
4. that the applicant has made a satisfactory showing of financial responsibility if required by 27.073 of this code;

Beyond that, Tex. Water Code §27.034 directs the Commission to adopt rules and procedures reasonably required for the performance of its powers, duties, and functions under Chapter 27 of the Tex. Water Code.

16 Texas Administrative Code §3.9 ("Statewide Rule 9") governs the permitting, use, and maintenance of a disposal well under the jurisdiction of the Commission. Specifically, Statewide Rule 9(1) provides oil and gas operators the following:

Every applicant who proposes to dispose of saltwater or other oil and gas waste into a formation not productive of oil, gas, or geothermal resources must obtain a permit from the Commission authorizing the disposal in accordance with this section

Pursuant to Statewide Rule 9, an operator is also required to demonstrate that fluids will be confined to the injection interval that is requested for disposal use. The examiners find that Manhattan has met this burden with the undisputed evidence. The subject well's proposed injection interval is continuous, and is capped by impervious interbedded shales and anhydrite. No where in the immediate case was confinement of disposal fluids to the proposed injection interval challenged.

This application boils down to one issue - which of the parties at hand will claim the San Andres Formation for disposal purposes near the subject well's proposed location; not, whether the subject well meets the requirements of Statewide Rule 9 or Tex. Water Code §27.051. Athlon's chief expert witness summed up its position with the following statement<sup>19</sup>:

[T]hat is why we prefer to control the injection into the San Andres immediately within and adjacent to our acreage so that we can minimize any potential risk to hydrocarbon recoveries within our acreage position...our concern is concentrated disposal into the San Andres formation that is overpressuring it as identified on Exhibit 14. Our purpose is to try to dissipate and expand our saltwater disposal system and spread that throughout our acreage and not put it in a concentrated area.

Athlon stated it is not opposed to saltwater disposal wells, and it knows there is a necessity for disposal wells; only, the difference between its disposal well operations versus Manhattan's disposal well operations is that Athlon is a more prudent disposal operator compared to a commercial disposal operator [Manhattan] (Pgs. 160-161).

### Public Interest

The examiners conclude that Manhattan clearly demonstrated that the subject well meets the public interest standard. The area wells surrounding the subject well, including Athlon's disposal wells, are at their disposal capacities. In fact, Athlon indicated that there has been an increase in drilling activity by other operators that offset Athlon's acreage to the northwest (Page 124, L. 6).

The examiners hold that Athlon's February 10, 2012 letter to Manhattan confirms that even Athlon concludes its existing disposal wells are at capacity. Mr. Grella's testimony confirmed that drilling in Howard County is on the rise and the need for additional disposal capacity goes hand-in-

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<sup>19</sup> See Transcript, Page 195, Lines 7-16.

hand with increased drilling. What's more, Athlon stated it would withdraw its protest in the instant case if Manhattan either chose a deeper injection interval than the San Andres formation, and/or moved the subject well's proposed location one mile north away from Athlon. The examiners find that Athlon's terms for its withdrawal of protest in the instant case contradicts its argument that the subject well is not needed.

Impairment of Existing Rights

The examiners find that Athlon alleged only one type of impairment in the captioned docket – potential impairment to Athlon's recovery operations of hydrocarbon reserves below the San Andres Formation within one mile of the subject well. However, the examiners believe that no harm to existing rights, including but not limited to mineral rights, will occur as a result of the subject well's approval.

Manhattan's petroleum engineering expert testified that the subject well would not harm productive intervals above or below the proposed injection interval because the proposed injection interval will contain 100% of the well's disposal fluids to the San Andres Formation (Page 20, L. 10). Manhattan's position went unrefuted in this respect.

Athlon alleges that 13.7 to 21 MMBOE may be at risk around the proposed location of the subject well. Yet, nowhere does Athlon prove its theory. Bear in mind that Athlon operates four of the existing area disposal wells, and that Athlon has drilled multiple production wells inside a distance of one mile from its Clyde SWD Well.

Athlon's position centered on tying together two claims: (1) that the San Andres Formation is overpressured as a result of injection/disposal into the San Andres Formation by certain area disposal wells; and (2) that the mentioned overpressurization creates interferences during the drilling and completion phases of production wells, which are drilled within one mile of certain disposal/injection well that utilizes the San Andres Formation.

The examiners note that when asked "aside from the H<sub>2</sub>S [hydrogen-sulfide] levels, do you have any other evidence that disposal into the San Andres caused the air and water flows encountered in these four wells," Mr. Holmes stated, "I don't have evidence. I just have strong correlation..." Further, when asked "do you know the depths at which that well [the Southwest Royalties J Cross SWD] was injecting at the time," Athlon's chief witness replied, "I am not familiar with the depths that they inject...I have no opinion".

In other words, Mr. Holmes' testimony indicates that Athlon's theory of potential harm to reserves below the San Andres Formation within one mile of a San Andres-disposal well is mere speculation. In fact, because Athlon successfully drilled three production wells between 0.4 and 0.7 miles of the most active disposal well in the area (*i.e.*, Athlon's Clyde SWD well), which utilizes the San Andres formation for disposal, the examiners find Athlon's argument discordant with its own operations.

Protection of Surface and Ground Water

Based on Manhattan's unrefuted evidence in this respect, the examiners find that Manhattan's proposed construction of the subject well will protect nearby surface and groundwater from disposal into the San Andres formation. Furthermore, the examiners find that Manhattan's proposed injection interval is appropriate, and that it will prevent migration of disposal fluids from escaping the proposed injection interval. Manhattan's proposed drilling, casing, and cementing program for the subject well conforms with Commission rule requirements, and was never challenged by Athlon to be inadequate. Moreover, there are no existing wellbores in the 1/4-mile AOR, and no evidence exists to suggest that the two existing wellbores inside the 1/2-mile AOR will be conduits for pollution. Athlon never challenged whether the proposed injection interval will confine disposal fluids from the subject well. In fact, Athlon alleges overpressurization which indicates the injection interval is adequately capped by impervious barriers above and below the proposed injection interval. Thus, Manhattan's proposed well construction, geologic evidence, and Areas of Review indicate that the subject application meets the requirements of Tex. Water Code §27.051 and Statewide Rule 9.

Showing of Financial Responsibility

Manhattan has made a satisfactory showing of financial responsibility as required by the Texas Water Code §27.073. Manhattan holds an active Form P-5, and the requisite financial assurance in the form of a blanket bond for \$50,000<sup>20</sup>.

**EXAMINERS' RECOMMENDATION**

It is the examiners' opinion that the subject application should be APPROVED because Manhattan has met its burden to show that the subject well meets the requirements of Tex. Water Code §27.051 and Statewide Rule 9.

**FINDINGS OF FACT**

1. At least ten (10) days notice of hearing in this case was provided to all affected persons.
2. Manhattan Petroleum, Inc. (P-5 No. 524391) ("Manhattan") seeks a commercial disposal permit for its proposed 87 Fairway SWD, Lease, Well No. 1 ("the subject well") to commercially dispose of saltwater and Resource Conservation and Recovery Act (RCRA) - Exempt Oil and Gas Waste ("the subject application").
3. Notice of the subject application was performed in accordance with 16 Tex. Admin. Code §3.9.

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<sup>20</sup> See Manhattan Exh. No. 3.

4. Notice of the subject application was published in the *Big Spring Herald*, a newspaper of general circulation in Howard County, Texas, on October 18, 2013 and May 15, 2014.
5. The subject application is protested by Athlon Energy Operating, Inc., now Athlon Holdings, L.P., (“Athlon”).
6. In the subject application, Manhattan seeks to permit the subject well in the following manner:
  - a. Commercial disposal of salt water and RCRA-exempt oil and gas wastes into the San Andres Formation through the depth interval from 3,000 feet to 4,600 feet;
  - b. A maximum daily injection volume of 20,000 barrels per day (“bpd”);
  - c. An average daily injection volume of 16,000 bpd;
  - d. A maximum surface injection pressure of 1,500 pounds per square inch gauge (“psig”); and,
  - e. An average surface injection pressure of 1,500 psig.
7. The subject well will be constructed in the following manner:
  - a. 9-5/8" surface casing set from surface to 400 feet, with cement circulated to surface;
  - b. 7" production casing set from surface to 5,006 feet with a differential valve (“DV”) tool at 3,700 feet, and cement circulated to surface.
8. The subject well is in the public interest as there is a need for the disposal of produced salt water and liquid oil and gas waste generated in the area surrounding the subject well’s proposed location.
  - a. The area disposal wells surrounding the subject well’s proposed location are at capacity;
  - b. Production well drilling is increasing in Howard County, which has resulted in the need for additional disposal capacity near the subject well’s proposed location.
  - c. On February 10, 2012, Athlon informed Manhattan that Athlon’s Clyde (API No. 42-227-35055) and Callie SWD (API No. 42-227-35134) commercial disposal wells have reached capacity;

- d. Athlon's Clyde and Callie commercial disposal wells utilize the San Andres formation for disposal purposes, and are located 0.8 miles northeast and 3 miles east of the subject well, respectively.
9. The use or installation of the subject well will not endanger or injure any oil, gas, or other mineral formation.
  - a. The San Andres formation is not productive within two miles of the subject well's proposed location;
  - b. The proposed injection interval is overlain by at least 500 feet of interbedded anhydrite and shale, which confine permitted disposal fluids from migrating above the top of the proposed injection interval, and, is underlain by a series of shales that create a boundary at the base of the San Andres formation.
  - c. Manhattan will confine one-hundred percent (100%) of the disposal fluids to the subject well's proposed injection interval.
10. The subject well will be constructed in a manner that protects surface water and groundwater from harm, as a result of disposal operations in the subject well.
  - a. On October 21, 2013, the Commission's Groundwater Advisory Unit ("GAU") concluded that the base or usable quality water ("BUQW") occurs at 275 feet, and that the base of the usable source of drinking water ("USDW") is at roughly 975 feet;
  - b. On May 30, 2014, the GAU determined that using the well for disposal from 3,000 feet to 4,924 feet would not endanger the freshwater strata in the area of the well;
  - c. There are no wellbores within one-quarter mile of the subject well's proposed location; and,
  - d. Neither of the two existing wellbores within one-half mile of the subject well's proposed location are considered potential conduits of pollution to surface water and groundwater.
11. Manhattan holds a active P-5, which permits it to perform under the Commission's jurisdiction as a operator of oil wells. Mr. Grella is the primary officer, and there is currently adequate financial security in the form of a \$50,000 bond

**CONCLUSIONS OF LAW**

1. Resolution of the subject application is a matter committed to the jurisdiction of the Railroad Commission of Texas. TEX. NAT. RES. CODE §81.051.
2. Legally sufficient notice has been provided to all affected persons. 16 TEX. ADMIN. CODE § 3.9(5).
3. The use or installation of the subject well is in the public interest. TEX. WATER CODE §27.051(a)(4).
4. The use or installation of the subject well will not endanger or injure any oil, gas, or other mineral formations. TEX. WATER CODE §27.051(a)(5).
5. The subject well will be constructed in a manner which will adequately protect surface water and groundwater from pollution. TEX. WATER CODE §27.051(a)(6).
6. Manhattan has made a satisfactory showing of financial responsibility. TEX. WATER CODE §27.051(a)(7).
7. Manhattan has met its burden of proof for commercial disposal authority in its proposed 87 Fairway SWD Lease, Well No. 1, and satisfied the requirements of TEX. WATER CODE §27.051, and 16 TEX. ADMIN. CODE § 3.9.

**EXAMINERS' RECOMMENDATION**

The examiners recommend that the subject application be APPROVED, granting Manhattan Petroleum Inc. commercial disposal authority in the San Andres Formation at its proposed 87 Fairway SWD Lease, Well No. 1 location.

Respectfully Submitted,



Brian Fancher, P.G.  
Technical Examiner



Marshall F. Enquist  
Hearing Examiner