



# RAILROAD COMMISSION OF TEXAS

## OFFICE OF GENERAL COUNSEL

**OIL & GAS DOCKET NO. 05-0268151**

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**THE APPLICATION OF CCS MIDSTREAM SERVICES, LLC. FOR A PERMIT TO OPERATE ITS VORTEX TREATMENT FACILITY, A COMMERCIAL STATIONARY TREATMENT FACILITY, ASSOCIATED DISPOSAL PIT AND COLLECTING PIT, JOHNSON COUNTY, TEXAS**

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**HEARD BY:** Andres J. Trevino, P.E., Technical Examiner  
Gene Montes, Hearings Examiner

**PROCEDURAL HISTORY OF CASE:**

Application filed:	November 09, 2010
Administrative Denial:	September 03, 2010
Notice of Hearing:	November 15, 2010
Hearing Held:	December 15 & 20, 2010
Transcript received:	January 10, 2011
PFD Issued:	January 25, 2012

**APPEARANCES:**

**REPRESENTING:**

**APPLICANT:**

Clay Nance  
Jay Stewart  
R. Scott Herbst  
E. Doyon Main  
Finis Shipman  
Mitch Zimmerman

CCS Midstream Services, L.L.C.

**PROTESTANT:**

David Cooney  
Travis Baer  
Michael Sims

Railroad Commission Staff

**EXAMINERS' REPORT AND PROPOSAL FOR DECISION****STATEMENT OF THE CASE**

CCS Midstream Services, L.L.C. ("CCS Midstream") requests authority to operate a commercial stationary treatment facility containing a concrete receiving pit (Receiving Pit) and a disposal pit (Pit #1) at its Vortex Treatment Facility, located approximately 2 miles northwest from the city of Alvarado, Texas in Johnson County. The proposed Vortex Treatment Facility will be located in the Barnett Shale area to provide services for operators there. The Receiving Pit will be used to receive and process waste and the Pit #1 will be used dispose of solid oil and gas wastes, primarily consisting of de-watered, water-based drilling fluids, drill cuttings and production tank bottoms.

The application was administratively denied by the Environmental Permits and Support, Technical Permitting Staff. The transmittal memo from the Commission's Technical Permitting Staff indicates that the application was administratively denied "...because the operation of a stationary treatment facility which includes disposal of oil and gas wastes, even in a pit equipped with a double liner and leak detection system, offers potential for pollution of groundwater and surface water." In summary, Staff indicated the site is unsuitable for several reasons including that groundwater is found at the site as shallow as 7 feet below ground surface. The bottom of the proposed pit is 25 feet below the ground surface. The site was used for sand and gravel mining and gravel is a highly permeable medium. Additionally, groundwater flows from the site toward a tributary of the North Fork of the Chambers Creek located 650 feet west of the disposal pit. Commission staff submitted evidence in support of its position that the application be denied.

**DISCUSSION OF THE EVIDENCE****Applicant's Evidence**

The proposed commercial Vortex Treatment Facility will be located on a 86 acre tract which is owned by CCS Midstream. CCS Midstream is a subsidiary of a large Canadian company with 25 years of experience operating 60 to 70 separate oil & gas waste operations throughout Canada, the United States including Texas, Louisiana, North Dakota and Pennsylvania. It is a well capitalized corporation with 3,000 employees across North America with 25 years of technical expertise with oil and gas waste management.

The site location was chosen, partially, because it is near the Barnett Shale play, its' easy access to Interstate 35 Highway and is adjacent to a CCS Midstream operated Vortex disposal well. The site's easy access to Interstate 35 will minimize truck traffic on rural roads thereby increasing safety and reducing rural road maintenance. The site was previously owned by Finis Shipman who over a period of 10 years mined the property for sand, clay and impounded water to sell as frac water to oil and gas operators. He stated he never mined gravel as there is no gravel on the site. Mr Shipman would remove the top layer of clay and sand, pile it up and sell it. Below the clay/sand was a consolidated sand layer which was not sold. Below the consolidated sand layer is a thick impervious shale layer. He would stop digging once he got to the consolidated sand layer. At times he would

dig through the consolidated sand layer and down to the shale layer. Rainwater would accumulate above the exposed shale layer. Initially he would drain off the rainwater by digging a canal and draining it off the pit area. Once water was removed from the pit no water would accumulate if there was no rainfall. Mr. Shipman testified no water seeped into the pit area from the sidewalls and water was only present after a heavy rainfall. Mr. Shipman began to impound rainwater by closing off the draining canal and began to sell the rainwater to oil and gas operators for frac water. The source of the impounded water was rain water and not existing ground water. An agreement exists between the Seller, Mr. Shipman and the Buyer, CCS Midstream that Mr. Shipman will drain all impounded water onsite prior to constructing the Vortex Facility. Currently the site is free draining and no longer has impounded water in a large portion of the 86 acre tract.

The primary types of wastes received at the Vortex Facility will be either liquid wastes (e.g. spent drilling mud) which are expected to be approximately 80% liquid and 20% solids or solid wastes (e.g. drill cuttings) which will be 80% solids and 20% liquids. Liquid wastes will be received at the site in vacuum trucks. Vacuum trucks will unload at one of four Receiving Bays. At the Receiving Bays, liquid waste will be discharged into facility piping via flexible hose. The piping will direct the waste into a below-grade concrete Treatment Facility Receiving Pit, which is one of two pits to be permitted.

The Treatment Facility Receiving Pit measures 106 feet by 66 feet and will have a capacity of 3,715 barrels. The Receiving Pit will have a concrete base pad. The slab will be sloped from near the finished grade surface to approximately 9 feet lower at the western end of the pit. The northern, southern and western sides of the Receiving Pit will be surrounded by a concrete wall. Trucks will be able to unload "wet" wastes at the eastern edge of the Receiving Pit. The Receiving Pit will be used to separate and collect liquids from "wet" wastes. The Receiving Pit will be used only to manage wastes and will not be used for the ultimate disposal or burial of wastes.

Liquids collected in the Receiving Pit will be pumped to above-grade tanks and/or to the Process Area for further processing. The Receiving Pit pumps will maintain a liquid level with a minimum two feet of freeboard. The Process Area contains equipment used to further process liquids by removing solids to prepare liquids for disposal offsite. The equipment includes a shaker, tanks, two centrifuges with catch tanks, polymer and acid tanks, mix tanks and a containment sump for wash downs and spills. Liquids processed in the centrifuges (centrate) will be stored in the centrate tanks. Liquids stored in the centrate tanks will be pumped to the Vortex No. 1 SWD disposal well on the adjacent CCS Midstream disposal well Vortex site. The Vortex disposal well is an existing commercial facility operated by CCS Midstream under a separate permit.

Wet solids received at the site will be placed onto the Process Solids Slab. Solids from the Process Area will also be placed on the Process Solids Slab. The Process Solids Slab will be a concrete slab approximately 6,000 square feet in size and will drain into the Receiving Pit. Drained solids remaining on the Process Solids Slab will be placed, as needed on to the adjacent Drying Pad.

Substantially dry solids and dry solids from the Process Solids Slab will be placed on the Drying Pad. The Drying Pad will be an approximately 2-acre area that is lined and

graded to a catchment area located on its southwest corner. The Drying Pad will be lined with a 3 foot thick compacted clay layer, and a 12-inch thick sacrificial soil protection layer. Any liquids drained from the substantially dry solids and precipitation will be collected in the catchment area. Liquids collected in the catchment area will be pumped into the Receiving Pit or pumped into the Process Area for treatment. A perimeter berm will be placed around the Drying Pad to prevent storm water run-off and run-on. Periodically, the substantially dry solids may be stabilized on the Drying Pad using lime, fly ash, cement or sawdust, if necessary, so the material will have sufficient bearing capacity to be placed in Pit #1.

The Pit #1 is a commercial solid waste landfill pit measuring 488 feet by 454 feet and will have a capacity of approximately 790,000 barrels. Pit #1 will be a state of the art disposal pit with a double high density polyurethane (HDPE) liner, leachate collection and leak detection systems. A plat of the facility layout is found in Applicant's Exhibit No. 3 and is included as Appendix A to this Proposal for Decision.

The base of Pit #1 will be built on top of an impervious shale layer. The shale layer will provide a natural barrier at the bottom of the Pit #1. After excavation of Pit # 1, the entire pit will be lined with a compacted clay barrier supported by the natural impervious shale layer. CCS Midstream partially chose the site because the existence of the impervious shale layer. Over the clay barrier a ground water relief drain will be placed adjacent to any water bearing sands found during the construction phase of the pit. The drain will be installed only if it is determined it is needed in constructing the pit liners. The drain will consist of a gravel-filled ground water interceptor trench that will drain to the ground water relief sump. The water will then be pumped to the Storm Water Detention Pond. Over the ground water drain will be a secondary HDPE 60 mil liner, which will serve as the secondary liner. On top of the 60 mil HDPE secondary liner, a leak detection drain will be installed. The drain consists of a geo-composite membrane that contains a non-woven synthetic resin filter that allows liquids to flow through it without plugging. Any leachate that reaches the geo-composite membrane will flow to a gravel filled leak detection trench. Liquids collected in the leak detection sump will be pumped to the leachate removal sump, where the liquids will be measured. The liquids will be pumped to the centrate tanks and then pumped to the Vortex #1 SWD well site for disposal. Over the leak detection drain will be a 60 mil HDPE primary liner. The 60 mil HDPE liner will be the primary liner for the pit. The liners will be anchored in place completely around each pit with an anchor trench filled with soil. Above the 60 mil primary liner will be a leachate collection geo-composite liner. This liner is similar to the leak detection membrane that will collect any liquids generated within the pit. Over the leachate collection geo-composite liner a 12-inch cushion layer of fine soil will be placed to protect the liners from the use of heavy equipment.

The Pit #1 will have a capacity of approximately 790,000 barrels of waste. Waste disposal is currently projected to fill the Pit #1 at a rate of 500,000 barrels per year. The rate is highly dependent on drilling activity and market conditions. The Pit #1 is expected to be filled in 1.6 years. Additional space is available on the 86 acre site to expand the pit. This will require subsequent permit amendments and permit applications to expand or add more pits. The Receiving Pit will have a capacity of 3,714 barrels of waste. The Receiving Pit will be used as a processing pit to settle out liquids from "wet" wastes. Wastes will be routinely removed from the Receiving Pit and placed in Pit #1 for disposal. Accumulation of waste in the Receiving Pit is not expected. The permit application is for the initial 5-year

period of operation of the Vortex Stationary Treatment Facility. With the existence of the adjacent Vortex SWD disposal well, the treatment facility is anticipated to have a long life. CCS Midstream will submit permit amendments and permit applications to extend the permit until CCS Midstream chooses to close the Vortex Treatment site. CCS Midstream will construct the Treatment Facility Receiving Pit and other Waste Treatment Facility Area components for an expected project life of 25 years.

The direction of groundwater flow in this area is to the west. The location of the facility does not have any wetlands or water courses and it is not within the 100 year flood plain. The average rainfall in the area is 33.6 inches and the average evaporation loss is 57.9 inches.

According to the USDS Natural Resources Conservation Service National Cooperative Soil Survey, there are three different soil types found at the 86 acre property, but the predominant soil is Crosstell. The Crosstell soils are fine sandy loam and cover approximately 50% of the property. The parent material consists of loamy residuum weathered from interbedded sandstone and shale. The Ferris-Heiden complex is clays covering approximately 30% of the property and the Heiden clay covers the remaining 20% of the property. The parent material for the Ferris component is residuum weathered from calcareous shale in the Eagleford Shale and Taylor Marl while the parent material for the Heiden component consists of clayey residuum weathered from clayey shale of the Eagleford Shale or Taylor Marl.

A database survey of water wells approximately 1 mile from the site revealed eleven wells in the search area. Ground water use in this area is typically from the Trinity Aquifer (Paluxy Sand). The Trinity Aquifer is the major aquifer serving the area. The Paluxy Sand is found at a depth of 800 feet below ground surface (bgs) under the site area. Some shallower water wells are drilled to depths between 185 and 245 feet bgs. These wells produce from the lower Woodbine formation. The upper Woodbine outcrops near the site where the formation does not serve as an aquifer. The upper Woodbine is iron-rich and less productive than the lower Woodbine. Some wells were producing at a level of 1,500 feet bgs from the Twin Peaks formation. A perched ground water was encountered at the site within a shallow silty sand with clay stringers above a shale zone found at a depth of 15 to 20 feet bgs.

In the immediate vicinity of Pit #1, CCS Midstream conducted a detailed geo-technical analysis. They identified three distinct soil layers identified as Zone A, B and C. Zone A is located 5 to 10 feet bgs and is comprised primarily of sandy, silty clay and some clayey sands. This Zone A was the zone that was primarily mined by Mr. Shipman. Zone A contains no water. Zone B is located below Zone A at a depth approximately 15 feet bgs. This zone is 10 to 15 feet thick and is wet. Zone B is the source of the ground water found in the pit area. Zone C is found below Zone B at a depth of 20 bgs. It is a very low permeability dry shale. It is approximately 90 to 110 feet thick. Zone C is dry and is an aquitard that isolates the Pit #1 area from the Woodbine Aquifer found at a depth of 185 to 220 feet bgs and the Trinity Aquifer found at a depth of 800 feet bgs. There is no communication between Zones A and B with the Woodbine Aquifer. There is no communication between Zones A and B with the Trinity Aquifer. There are no area water

wells that are screened in Zone A, Zone B or Zone C within a one mile area of review. CCS Midstream calculated the ground water flow rate in the pit area is 7.4 feet per year. At the rate the ground water flows it would require 88 years to travel the 650 foot distance to reach the North Fork of the Chambers Creek identified in the Staff's denial letter.

CCS Midstream investigated the aerial extent of Zone B, the zone containing the shallow groundwater by reviewing area well logs, well records and soil borings. CCS Midstream determined the water bearing Zone B sand is a perched, non continuous zone of limited extent. The Zone B sand was not present to the west, east or north of the facility. Zone B is not continuous to the North Fork of Chambers Creek implying there is no connection of the groundwater found at the Pit #1 area to the North Fork of Chambers Creek, 650 feet to the west. CCS Midstream reviewed two ephemeral creeks in the area. One ephemeral creek was referenced in the Commission's Staff denial letter as being a conduit to a fishing Pond. The second creek is located at the 28 acre Vortex SWD disposal well site. A cross section of the second ephemeral creek indicates the banks of the creek are exposed Zone B (wet sand) material and the bed of the creek are Zone C (shale). Testimony was given that both ephemeral creeks do not flow everyday or year round. Both creeks are primarily dry except for periods of heavy rain.

CCS Midstream proposes the installation of six groundwater monitoring wells around the perimeter of the treatment facility. One monitoring well will be located up gradient of the Pit #1. The well will be used to collect and measure background water quality. There will be three down gradient monitoring wells adjacent to Pit #1 and two down gradient monitoring wells adjacent to the processing/treatment area. Each well will be completed in the shallowest groundwater zone and water from these wells will be analyzed on a quarterly basis to demonstrate that the proposed disposal is not adversely affecting the groundwater.

Pit #1 will be closed after waste reaches a level in the pit that provides 2 feet of freeboard or if waste is no longer being accepted. The leachate collection system will remove liquids and the waste will be solidified with stabilizing agents, if necessary. A pit cap will be placed over the Pit #1 at closure. The pit cap will have fill placed above the waste to fill-in and slope the cap. A 6-inch layer of fine soil will go over the cap fill. A cap 40-mil HDPE liner will be placed over the fine soil. A 12-inch layer of fine soil will be placed over the liner to protect it. Above the fine soil layer will be a 6-inch layer of topsoil to allow the growth of a vegetative cover. The cap is designed to entomb the waste, prevent the infiltration of rain water and provide long term waste burial. The estimated closure cost for the Pit #1, assuming the that the entire surface of Pit #1 will be covered with the cap, is \$396,000.

The Waste Treatment Facility including the Receiving Pit will be closed by processing remaining waste, removing and disposal of remaining waste, removing remaining equipment, excavating and disposal of affected material and performing confirmation sampling. The total cost to close Pit #1, the Treatment Facility Receiving Pit and the Treatment Facility is \$803,000.

On cross examination of the Staff, Staff confirmed pits may be permitted with liners in the presence of ground water. Staff confirmed there is no requirement that liners last

forever. Staff confirmed there is no available technical information on whether a liner will fail or not. The Commission's rules have no requirements that liners last forever. CCS Midstream identified two commercial disposal pits that were recently permitted by the Commission's Staff where ground water was found near the surface and required the installation of a liner. The WFI Windmill facility in Johnson County and the K-3 Resources facility in Jim Wells County. At the K-3 Resources Facility water was found at a depth of 15 to 35 feet bgs. The base of the pit in the K-3 Resources facility is at 20 feet bgs. During the soil investigation for the WFI Windmill facility, ground water seepage was found in two boreholes at a depth of 10 to 15 foot bgs level. Water was found to be seeping from fractured limestone cliffs in the pit area. The geotechnical report in that application stated "... The use of the pit without a liner for the disposal of oil and gas wastes offer the potential for pollution." This statement, according to CCS Midstream is evidence that the use of a liner is an accepted method to operate a disposal pit near groundwater. The Commission approved the WFI Windmill facility with a single 30 mil liner. Approval of the WFI Windmill pit with a liner is evidence the Commission Staff believes that a liner is a protective barrier.

CCS Midstream representative, Scott Herbst, testified operating an oil and gas waste facility in shallow ground water is not new to CCS Midstream. Scott Herbst testified it is quite common to find some shallow ground water is present in many regions throughout North America. CCS Midstream has similar facilities to the Vortex facility that are placed in areas where shallow ground water is found. As a result of the engineered barriers designed into the pits, the construction quality of those barriers and care to protect ground water, CCS midstream has never seen any impacted ground water at any of their sites. All these sites have had ground water monitoring installed from the initial start up and have not detected any ground water contamination.

The Surface Waste Management Manual requires monitoring wells be installed if water is encountered in a bore hole within a 100 foot depth. The Manual states monitoring wells may not be required if a pit is double lined and has a leak detection system. The CCS Midstream's Vortex Treatment Facility will have both a double lined pit with a leak detection monitoring system and ground water monitoring wells.

### **Environmental Services Staffs' Position**

The subject application was administratively denied by Environmental Services because the proposed Pit #1 lies adjacent to a perched water zone. Staff believes because the wastes will remain forever in the Pit #1, there is a potential that wastes will escape over time and contaminate ground water and an adjacent intermittent stream 650 feet to the west of Pit #1. Staff argues they can not issue a permit if the Staff cannot determine that the operation of the facility will not cause pollution of subsurface water or surface water.

Staff stated that Railroad Commission may issue a permit if it will not result in pollution. Statewide Rule 8 requires protection of ground water regardless of type or quality. Staff also wants to protect a surface body of water identified as Soil Conservation Service Site 30. A description of the reservoir indicates it is a fishing resource. The Site 30 pond is located downstream of an ephemeral creek. Staff agrees ground water flows at a rate of 7.4 feet per year. Staff feels they could not determine that the disposal operation at this facility would not cause the pollution of ground water or surface water. They stated

that the water bearing zone is at the same level as the pit walls. The pit may impair ground water. Staff stated they cannot make a determination that the pit will not pollute because of the presence of shallow ground water and that the liner will not last forever.

Though the design of the Pit #1 includes a leak detection system connected to monitor wells, Staff is concerned that this system will only be in place during the life of the pit and for a short period of time after closure. The Staff argues the waste is expected to be in the pit forever and there will be no means to determine if the primary liner is somehow later compromised.

Staff does not believe that the Pit #1 permit should be approved because it would present a threat to pollution of ground water sources. Staff believes that the design of the proposed Pit #1 is such that the chance of pollution as the liners would not last forever and the eventual failure of the liner would harm ground water resources.

### EXAMINERS' OPINION

The examiners recommend that the application be approved because CCS Midstream has demonstrated that the operation of the proposed stationary treatment facility and associated pits would not harm groundwater resources, as required by Statewide Rule 8. Statewide Rule 8 (d) (6) states as follows:

“A permit to dispose of oil and gas wastes by any method, including disposal into a pit, may only be issued if the Commission determines that the disposal will not result in the waste of oil, gas, or geothermal resources or the pollution of surface or subsurface water.”

The design of the pits is unquestionably state of the art. Staff does not disagree. However, Staff believes that the location of the proposed pit base adjacent to a ground water bearing sand is unsuitable, regardless of the design of the pit.

The Commission rules do not exclude a pit from being near or even adjacent to ground water, in fact Commission rules have additional provision requirements in cases where ground water is found near the pit. CCS Midstream has complied with all the requirements found in Statewide Rule 8 and the Surface Waste Management Manual. CCS Midstream's design of Pit #1 exceeds the requirements of Commission rules and guidance documents as a pit may be exempt from ground water monitoring as the pit has a double liner and a leak detection system. CCS Midstream will incorporate a ground water monitoring system. Additionally, Statewide Rule 8 and the Surface Waste Management Manual do not have any requirements that the HDPE liner last forever, in fact the 60 mil HDPE liner is the industry standard for municipal and RCRA hazardous waste landfills. The HDPE liner material is chemically inert to the affects of the chemicals anticipated to be disposed in the pit.

The examiners believe that the use of secondary and primary geo-synthetic 60 mil liners, in conjunction with the leachate collection system, leak detection system and ground water monitoring wells for the Pit #1, will provide for protection of surface and subsurface water resources. Additionally, the waste to be disposed of into the pits will be de-watered,

solid waste which will remain nearly void of liquids at all times. In the unlikely event that the primary liner is somehow compromised, the leak detection system will provide a prompt signal if any liquid accumulates in the geonet netting layer above the secondary liner. If such a leak is detected, the District Office must immediately be notified and operations would have to cease until the liner is inspected and repaired. CCS Midstream anticipates a 25 year life for the facility, there will be the opportunity for monitoring of leaks in the primary liner for 20-25 years, even though Pit #1 will only have a life of 2-3 years. This continuous monitoring over the life of the entire project will provide immediate knowledge that the primary liner in Pit #1 has been compromised. If Pit #1 experiences no leak in the primary liner in 20-25 years, the examiners believe that it is highly unlikely that a leak would ever occur to the point of breaching the secondary liner and polluting ground water.

The geology is ideal in protecting both minor and major aquifers in the area. A 110 foot thick, dry, impervious shale layer forms a natural containment layer that separates waste management activities in the proposed Vortex facility from the Trinity Aquifer (major) at 800 feet bgs and the Woodbine Aquifer (minor) found at 225 feet bgs. The site was partially selected due to the existence of the 110 foot thick shale layer.

The geological investigation also determined two ephemeral creeks located to the east and west of the site are likely connected hydraulically to the ground water found in Zone B. Assuming the current groundwater flow rate of 7.4 feet per year and the Zone B hydraulic head remains constant, it would take nearly 9 years for ground water near the pit to travel to the creek to the west. The liner leak detection system and the ground water monitoring wells adjacent to the pit would detect a release before reaching the creek. Testimony was given that both ephemeral creeks do not flow everyday or year round and both creeks are primarily dry except for periods of heavy rain. This is an indication that ground water flow and recharge is not constant but flow and recharge is affected by rainfall and any impounded water. The construction and operation of the Vortex facility will eliminate all water impounding therefore ground water levels should drop. The examiners believe mining activity by the previous landowner (Finis Shipman) increased ground water saturation as it exposed Zone B to rainfall and to impounded rainwater.

The geological investigation also determined the North Fork of the Chambers Creek is not likely to be hydraulically connected to the Zone B groundwater. Soil borings and well records show that Zone B sand is discontinuous and does not exist to the west of the Vortex site. The investigation found no gravel at site. The lack of gravel was verified by Finis Shipman as he stated he never mined gravel during his 10 years of operating the mine site.

In conjunction with continued monitoring of the leak detection system associated with Pit #1, CCS Midstream is also required to perform quarterly water sample analyses on each of the six perimeter groundwater wells. This testing will also be required for the life of the project and will provide information as to whether a breach has occurred to the secondary liner in the pit. The life expectancy of the Vortex facility is expected to be extended as the adjacent CCS Midstream owned and operated Vortex saltwater disposal well which has been in operation for 5 yrs is expected to be operated for an additional 20 years.

With the existing geology and ground water identified at the site and the design of

the facility, the examiners believe that the proposed Vortex facility and associated pits can be operated without adversely affecting surface and subsurface waters.

### FINDINGS OF FACT

1. Notice of this hearing was given to all affected persons at least ten days prior to the date of hearing. Notice of the application was published in the *Cleburne Times-Review*, a newspaper of general circulation in Johnson County, on May 4 and May 11, 2010.
2. CCS Midstream Services, L.L.C. requests authority pursuant to Statewide Rule 8 to operate a commercial Stationary treatment facility and processing and disposal pits at its proposed Vortex Facility, located approximately 2 miles northwest of the city of Alvarado. The pits will be used to process and dispose of solid oil and gas wastes, primarily consisting of de-watered drilling fluids and drill cuttings.
3. The application was administratively denied by staff of the Commission's Technical Permitting Section because the operation of a stationary treatment facility offers potential for pollution of groundwater and surface water. Additionally Staff believes the site is unsuitable.
  - a. The bottom of the proposed pit is 25 feet below the ground surface (bgs). Groundwater is found at the site as shallow as 7 feet below ground surface.
  - b. The site was used for sand and gravel mining and gravel is a highly permeable medium.
  - c. Groundwater flows from the site toward a tributary of the North Fork of the Chambers Creek located 650 feet west of the disposal pit.
4. The proposed commercial Stationary treatment facility and processing and disposal pit will be located on a 86 acre tract which is owned by CCS Midstream.
5. The proposed site offers easy access to Interstate 35, reducing truck traffic on rural roads.
6. The Vortex Stationary Treatment Facility contains equipment and waste management units to process and stabilize oil and gas wastes including two pits, the Receiving Pit and the Pit #1.
7. The Receiving Pit will be approximately 106 feet long and 66 feet wide and will have a capacity of approximately 3,715 barrels. The Receiving Pit will be used only to manage wastes and will not be used for the ultimate disposal or burial of wastes.

8. The primary types of wastes received at the Vortex facility will be liquid wastes (spent drilling mud) consisting of 80% liquid and 20% solids or solid wastes (drill cuttings) consisting of 80% solids and 20% liquids.
9. Liquids collected from wet wastes will be treated and disposed of off-site by injection in the Vortex SWD disposal well located adjacent to the Vortex Stationary Treatment Facility.
10. Wastes received in Pit #1 will be dry and stabilized with saw dust, lime, fly ash or dry cement.
11. The Pit #1 will be approximately 488 feet long and 454 feet wide and will have a capacity of approximately 790,000 barrels. Pit #1 will be used to dispose of dry wastes only.
12. Water well records identified major and minor aquifers in the area.
  - a. The Lower Woodbine (minor) is found at a depth of 185 to 245 feet bgs under the site.
  - b. The Trinity Aquifer (Paluxy Sand) is the major aquifer serving the area and is found at a depth of 800 feet bgs under the site.
  - c. The Twin Peaks formation provides water at a depth of 1,500 feet bgs under the site.
13. Geotechnical investigation conducted on the property identified three distinct soil zones and a ground water zone.
  - a. Zone A is located 5 to 10 feet bgs and is comprised primarily of sandy, silty clay and some clayey sands. This Zone A was the zone that was primarily mined by Mr. Shipman. Zone A contains no water.
  - b. Zone B is located below Zone A at a depth approximately 15 feet bgs. This zone is 10 to 15 feet thick and is wet. Zone B is the source of the ground water found in the pit area.
  - c. Zone C is found below Zone B at a depth of 20 bgs It is a very low permeability dry shale. It is approximately 90 to 110 feet thick.
14. The water zone was founded to be perched, noncontiguous and of limited extent.
  - a. Groundwater was found in Zone B only, above the Zone C shale layer at a depth of 15 to 20 feet bgs.
  - b. Zone C is dry and is a natural barrier that isolates shallow ground water from the Woodbine Aquifer and the Trinity Aquifer.

- c. Soil borings, well logs and well records confirm Zone B sands were not present to the West, East or North of the Vortex property.
  - d. There are no water wells completed within a one mile radius that are completed in the same Zone B sands.
15. Gravel is not present at the Vortex facility and was never mined by Finis Shipman during the period he owned the property.
16. Impounded water collected at the property and sold as frac water originated as collected rain water and not ground water.
17. The ephemeral creeks to the East and West of the Vortex facility are primarily dry and only flow after periods of heavy rain.
18. Soil investigations determined that the Zone B sands, the ground water containing sand is discontinuous to the North Fork of the Chambers Creek. It is unlikely the ground water found at the Vortex site is hydraulically connected to the North Fork of the Chambers Creek.
19. Use of Pit #1 for disposal of solid waste will not endanger usable quality water resources, as Pit #1 will be artificially double lined and equipped with a leak detection system.
- a. The base of Pit #1 will be built over a 100 foot thick impervious shale barrier.
  - b. The 110 foot shale barrier separate and isolates Pit #1 from all major and minor aquifers identified in the area.
  - c. After excavation of Pit #1, the entire pit will be lined with three feet of compacted clay with permeability of  $10^{-7}$ .
  - d. Adjacent to the walls that may contain water bearing soils, a ground water relief drain will be built if needed.
  - e. Over the clay liner a 6 inch fine soil layer will be placed to protect the 60-mil High Density Polyethylene (HDPE) from the clay barrier.
  - f. Over the 6 inch fine soil layer, a geo-synthetic 60-mil HDPE liner will be placed over the entire pit area, which will serve as the secondary liner.
  - g. On top of the 60-mil HDPE liner, a layer of HDPE geonet netting will be installed, which will serve as the liner leak detection drain. The HDPE geonet netting will allow fluids escaping from the primary liner (should a leak occur) to flow towards center and towards the northern end of the pit where it will be collected at a sump and detected by

Vortex personnel.

- h. Over the HDPE geonet netting , a second geo-synthetic 60-mil HDPE liner will be placed over the entire pit area, which will serve as the primary liner.
  - i. A second layer of HDPE geonet netting will be placed over the 60-mil HDPE primary liner on the flat bottom portion of the pit. This second HDPE geonet netting will serve as the leachate collection system's liner. The leachate collection system removes any liquids that may be generated within the pit.
  - j. A 12 inch layer of fine soil or waste will then be placed on top of the netting, which serve as a liner cushion allowing the use of heavy equipment without compromising the liners.
  - k. A 2 foot layer of fine or waste will be used as an interior access road fill. This will allow added protection of the waste and liners from daily travel of heavy equipment in the pit.
  - l. Continuous monitoring of the leak detection system in Pit #1 over the life of the entire project will provide immediate recognition of a leak in the primary liner, providing additional protection of any ground water.
20. The installation and monitoring of six groundwater monitoring wells around the perimeter of the property will provide data necessary to determine if the primary and secondary 60 mil liners in Pit #1 has been breached. These wells will be monitored for life of the project.
21. The location of the site meets requirements set out in Statewide Rule 8 and the Commission's Surface Waste Management Manual. The location of the facility does not have any wetlands or water courses and it is not within the 100 year flood plain. The average rainfall in the area is 33.6 inches and the average evaporation loss is 57.9 inches.
22. A sloped pit cap will be placed over the Pit #1 at closure. The cap is designed to entomb the waste, prevent the infiltration of rain water and provide long term waste burial. A 6-inch layer of fine soil will go over the cap subgrade fill. A cap 40-mil HDPE liner will be placed over the fine soil. A 12-inch layer of fine soil will be placed over the liner to protect it. Above the fine soil layer will be a 6-inch layer of topsoil to allow the growth of a vegetative cover.
23. The estimated closure cost to close Pit #1, assuming that the pit is full, is \$396,000. The total cost to close Pit #1, the Treatment Facility Receiving Pit and the Treatment Facility is \$803,000. CCS Midstream is required to submit this amount of financial security prior to operating the facility.

24. There is no Railroad Commission requirement, statute, regulation or guidance document that prohibits a pit to be built where there is groundwater in existence near the pit.
25. There is no Railroad Commission requirement, statute, regulation or guidance document that requires a HDPE liner to last forever.
26. The design of the Vortex facility exceeds the requirements set out in the Commission's Surface Waste Management Manual as the Pit #1 will have both a double lined pit with a leak detection system and a ground water monitoring system. The Surface Waste Management Manual states "...monitoring wells may not be required if the pit is double lined with a leak detection system".
27. In other regions in North America where CCS Midstream has similar facilities, as the proposed Vortex facility and that have shallow ground water present, ground water monitoring has detected no impact on ground water at any of their sites.

**CONCLUSIONS OF LAW**

1. Proper notice was issued as required by all applicable codes and regulatory statutes.
2. All things have occurred and been accomplished to give the Commission jurisdiction to decide this matter.
3. CCS Midstream Services, L.L.C.'s application to operate a commercial stationary treatment facility and associated collecting pit and dispose of solid oil and gas waste in a disposal pit at the Vortex Treatment Facility complies with Statewide Rule 8 and will not cause pollution of surface water, useable quality water or result in waste of oil, gas or geothermal resources.

**EXAMINERS' RECOMMENDATION**

The examiners recommend that the application to operate a commercial stationary treatment facility and associated collecting pit and disposal pit at the Vortex Treatment Facility be approved as set out in the attached Final Order and the associated permits.

Respectfully submitted,



Andres J. Trevino, P.E.  
Technical Examiner



Gene Montes  
Hearings Examiner