WENCK File #B2579-0034
November 2018

Andeavor NGL Pipeline Project
Topsoil Inspection Report
PU-18-72




Prepared for:

North Dakota
Public Service Commission

600 E. Boulevard Avenue
Bismarck, ND 58505-0480

WENCK
Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
301 1st Street NE, Suite 202
Mandan, ND 58554
Phone: 701-751-3370
Fax: 763-479-4242

Table of Contents

TABLES

APPENDICES

Executive Summary

The North Dakota Public Service Commission (PSC) retained Wenck Associates, Inc. (Wenck) to complete topsoil inspections during construction of the Andeavor 6 and 8-inch Natural Gas Liquids (NGL) Pipeline (Project) in McKenzie, Billings, and Stark Counties, North Dakota (ND), constructed by Andeavor Field Services LLC (Andeavor). The purpose of the inspections was to ensure the project was constructed in compliance with the siting laws and rules and the applicable PSC Orders for the Project, which includes a requirement that topsoil must be segregated from subsoil during installation of the pipeline.

A pre-construction conference call was held for the Project on 15 June 2018; Wenck attended the call. Construction involving soil disturbance for the Project began 20 June 2018. Wenck reviewed Project documents to become familiar with the Project and PSC Orders for the Project. Wenck visually inspected the Project area on 20 June 2018 and observed topsoil and subsoil removal and segregation done by two separate contractor crews on three pipeline segments. Another topsoil inspection was completed on 12 July 2018 and a final topsoil inspection conducted on 29 October 2018 once work resumed after a hiatus due to loss of access rights. Overall soil removal and storage processes were satisfactory and completed properly. Issues were observed during two toning on hilltops where subsoil piles slightly came in contact with topsoil stockpiles; however, a plan for resolving this issue was in place to implement during backfilling.

1.0 Background and Scope

1.1 INTRODUCTION

The Andeavor 6 and 8-inch mixed natural gas liquids (NGLs) will be comprised of four pipeline segments. The first segment, the North Segment, is located in McKenzie County and will transport NGLs, or Y-Grade product, approximately 17 miles from Oasis Midstream Services LLC's Wild Basin Gas Plant to an interconnection in T149N, R98W, Section 30, McKenzie County, with an existing 42-mile pipeline previously permitted and constructed by BakkenLink Pipeline, LLC. The second segment is the existing BakkenLink Pipeline permitted by the Commission in Case No. PU-10-218. The third segment, the South Segment, will interconnect with the existing BakkenLink Pipeline in T142N, R99W, Section 3, Billings County, to transport the NGLs south approximately 22 miles to Andeavor's Belfield Gas Plant in Stark County. At the Belfield Gas Plant, the mixed NGLs will be separated into discrete components. The fourth segment, the Transfer Line Segment, will be comprised of four pipelines that will transport the four discrete components approximately 5 miles from Andeavor's Belfield Gas Plant to the Fryburg Rail Terminal located in Billings County.

The pipe for the North Segment and South Segment will be 8-inch diameter steel pipe with 0.25 inches wall thickness for line pipe and 0.500-inches for bore pipe. The maximum operating pressure will be 1,480 pounds per square inch and the maximum flow rate of each pipe will be 43,000 barrels per day. For the four pipelines of the Transfer Line Segment, the pipe will be 6-inch diameter steel pipe with 0.25 inches wall thickness for line pipe and 0.500-inches for bore pipe. The maximum operating pressure will be 1,480 pounds per square inch and the maximum flow rate will be 34,000 barrels per day. The Project is under the jurisdiction of the North Dakota Public Service Commission (PSC), which issued its Findings of Fact, Conclusions of Law, and Order in Case No. PU-18-72 on 13 June 2018, granting Certificates of Corridor Compatibility No. 205, 206, and 207 and Route Permits No. 215, 216, and 217 for the Project.

1.2 REGULATORY PURPOSE AND SCOPE OF WORK

The North Dakota Energy Conversion and Transmission Facility Act (North Dakota Century Code Chapter 49-22) authorizes the Public Service Commission to determine that the location, construction, and operation of jurisdictional energy conversion and transmission facilities will produce minimal adverse effects on the environment and the welfare of citizens of North Dakota. Construction inspections ensure that such projects are constructed in compliance with the siting laws (North Dakota Century Code Chapter 49-22) and rules (North Dakota Administrative Code Article 69-06) and the applicable Commission Orders.

The North Dakota PSC retained Wenck Associates, Inc. (Wenck) to complete a construction inspection, and specifically a topsoil inspection, of the Project. The inspection process included a review of the Application for Corridor Compatibility and Route Permit, the Project's Order, and other applicable documents. PSC Order #12 for the Project states: "Company understands and agrees that all topsoil, up to 12 inches, or topsoil to the depth of cultivation, whichever is greater, over and along trench areas where cuts will be made, must be stripped and segregated from the subsoil. Any area on which excavated subsoil will

be placed must also be stripped of topsoil. After backfilling is completed, any excess subsoil must be placed over the excavation area, blending the grade into existing topography. Topsoil must be replaced over areas from which it was stripped only after the subsoil is replaced."

Wenck's scope of work was to perform and document on-site inspections during the topsoil removal phase of the Project to verify that topsoil was properly removed and kept segregated from subsoil until replacement occurred. The number of on-site inspections was to be based on Wenck's determination that equipment operators demonstrated proficiency concerning topsoil and subsoil removal and segregation in compliance with the Commission's Order. This report includes, but is not limited to, documentation of site visit observations and a summary of findings and issues that should be addressed for the Project to be considered complete and in full compliance.

1.3 BACKGROUND

During pipeline installation and excavation work in general, it is important to separate topsoil and subsoil. Topsoil has biological, physical and chemical properties that are critical to recovery of a site. Topsoil, also known as the A horizon, should be stripped to the correct depth according to natural variations in the depth of this top layer of soil. Distinguishing the horizon boundaries can be difficult as they vary in distinctiveness and topography. Most boundaries are zones of transition rather than sharp lines of division. Boundary distinctiveness is the vertical distance over which one horizon transitions into another which can be abrupt, clear, gradual or diffuse. The boundary topography is the cross-sectional shape of the contact between the horizons which can be smooth, wavy, irregular or broken (Soil Survey, 1993).

Mixing subsoil in with the topsoil is usually detrimental to the reclamation and re-vegetation of a site. Subsoil material has lower organic matter content than topsoil, making it typically lighter in color. It may also have a different texture than the topsoil (Sedivec et al., 2014). The most visible impact of pipeline constructions on agricultural land is the mixing of organic and nutrient rich topsoil with less fertile, mineral subsoil, which can bring up toxic elements such as sodium that restrict plant growth (Folga, 2007).

2.0 Findings of Site Inspection

2.1 METHODS

Luke Menden, Wenck Environmental Scientist, visited the Project site on 20 June 2018, 12 July 2018, and 29 October 2018. Representatives from Shafer, the Construction Management company, Craig Kitchens, Jimmy Preece, and Scott Staehnke, accompanied Wenck staff during the visits. Shafer, under management by Craig Kitchens, oversee the daily actions of the construction contractors to ensure work is being conducted according to approved plans and procedures.

The site was inspected visually by driving to access points and walking or driving within the Project right-of-way (ROW). Topsoil removal began at two separate locations on the day of the first inspection, 20 June 2018. Two pipeline contractor companies worked on two different spreads; Jones Contractors began on the North Segment and Jomax began on the South Segment. Jones Contractors began topsoil removal at the ROW located east of Watford City and north of highway ND-23 and continued working northward. Jomax started removing topsoil west of Fairfield working to the south. The following inspections focused on particular areas throughout the Project area. Contractors/equipment operators were observed during the topsoil removal phase of the Project to check that topsoil has been properly removed, piled, and kept segregated from subsoil. Digital photographs (iPhone 6, 8 megapixels) were taken showing typical Project infrastructure and documenting problem areas (**Appendix A**). Geographic coordinates were recorded at observation points or potential problem areas using a handheld Global Positioning System (GPS) (Garmin GPSMAP 60CSx; <10m accuracy; NAD83 datum) (**Table 1**).

2.2 ON-SITE INSPECTION OBSERVATIONS

Construction for the Project began 20 June 2018. Wenck staff met with Shafer construction manager Jimmy Preece at the first construction location near Watford City, on the North Segment. Jones Contractors did not conduct any ground disturbing work until Wenck and Shafer staff were on site. The Project ROW had been mowed prior to arrival. A grader began the topsoil disturbance by making a pass along the edges of the ROW to mark the extent of the work area. Dozer operators then moved topsoil to the east edge with spotters observing the work to ensure nothing occurred outside the ROW. The dozer performed several passes over each area of ground removing a couple inches of soil with each pass until the subsoil was reached at a depth of around 8 inches. Contractors often employ a combination of graders and dozers depending on the equipment available, depth of topsoil, land use and procedure used to remove the topsoil (**Appendix A, Photos 1-3**).

Later in the day on 20 June 2018, Wenck staff met with Shafer construction manager Craig Kitchens and the Jomax contractors at the Fairfield location, on the South Segment. Topsoil removal at this location proceeded in a similar manner to the Watford City location. The ROW was mowed prior to arrival and ground disturbance did not begin until Wenck staff arrived on location. Only one dozer was active at the time of the inspection. The dozer operator began by grading a line along both sides of the ROW with the edge of the dozer blade to mark the topsoil removal work area for the day. Then the dozer began moving the topsoil from the west edge towards the center of the ROW. Several passes were made with the dozer to reach the depth of the subsoil around 8 inches. After the subsoil was reached

along the length of the project area, the machine operator began moving the topsoil pile to its final stockpile location along the eastern edge of the ROW (**Appendix A, Photos 4-7**).

The next topsoil inspection was conducted on 12 July 2018. This inspection focused on the 6 in. Transfer Segment line running from Belfield to the Fryburg Rail Terminal. Wenck staff met with Scott Staehnke on location to observe topsoil removal by Jones Contractors. Topsoil removal was completed at this location prior to arrival and looked adequate. Mr. Staehnke mentioned that initial topsoil removal on the first day of construction was around 8 inches but needed to be deeper in some areas. This site contained a hilltop which can complicate topsoil removal. Topsoil was pushed to the south side of the ROW and then another pass was made into the subsoil to create a level surface for installing the pipe. The subsoil pile was stored next to the topsoil and the two piles slightly came in contact with each other (**Appendix A, Photo 9**). Mr. Staehnke is aware of this and noted that the machine operators who spread the excavated soil will pull from the pile starting with the subsoil during backfilling. After all the subsoil is graded, another pass with the grader will be completed to spread the bit of soil where the sub and topsoil were contacting each other. Then the topsoil will be placed over the disturbed subsoils. This will help ensure that any subsoil/topsoil mix is located above the subsoil layer while still being buried beneath all the unmixed topsoil (**Appendix A, Photos 8-9**).

Another topsoil inspection occurred on 29 October 2018 to view Jomax contractors along the Fairfield location, on the South Segment. Temporary loss of ROW due to expiration of access agreements access postponed work in this area. Topsoil removal appeared to be going smoothly. Topsoil stripping varied in depth up to around 9 in. The location of the inspection was fairly flat which allowed for smooth topsoil removal. Topsoil was stored on the west side of the ROW and appeared to contain very little subsoil. A very small amount of subsoil could be seen in the topsoil pile but the amount was negligible. To ensure all topsoil was removed, the subsoil must be visible on the excavated surface and it is expected that a small amount of subsoil is disturbed on the excavator's final pass. Respreading of the topsoil will occur as described above; the stockpile containing any mixture of soils will be spread first, leaving the pure topsoil on the surface (**Appendix A, Photos 10-11**).

In general, the contractors did a good job with the stripping of topsoil. Contractors paid close attention to topsoil stripping depths which tended to vary several inches depending upon the location. In flatter areas, topsoil stockpiles were kept as free of subsoils as possible. Hilltop stripping required separate stockpiles of subsoil in order to create a level workspace for equipment and pipe installation. Shafer construction inspectors were aware that the subsoil and topsoil stockpiles would come in contact with each other on these hilltops and had a plan for spreading these stockpiles in a way that minimized topsoil mixture.

3.0 Issues to Resolve and Recommendations

3.1 MINOR ISSUES OBSERVED

During site inspections, there were several locations where the subsoil pile was observed touching the topsoil pile, and locations where subsoil was mixed slightly with the topsoil. On hilltops, subsoil is removed in order to create a level surface to operate and install pipe. Subsoil stockpiles were created and touched topsoil stockpiles. This will result in slight mixing of the sub and topsoil at the points of contact. The final pass taken by graders during topsoil stripping inevitably disturb a small amount of subsoil. Both of these types of mixing are minimal and were known to occur by the contractors. The mixed soils are located on the surface of the stockpile and will be the first layer spread when replacing the soils. As a result, any mixed soils will be covered with a majority of the topsoil.

4.0 References

North Dakota Public Service Commission (ND PSC). 2018. Online Case Search. Available from: http://www.psc.nd.gov/database/company_case_list.php. Accessed October-November 2018.

Kitchens, Craig. Preece, Jimmy. Staehnke, Scott. Shafer Construction Management. Personal Communication: discussion during site visits on June 20, July 12, October 29, 2018 and on project coordination for site visits.

Folga, S. M. 2007. Natural Gas Pipeline Technology Overview. Argonne National Laboratory. http://corridoreis.anl.gov/documents/docs/technical/apt_61034_evs_tm_08_5.pdf. Accessed December 2015.

Sedivec, K., C. Piper, J. Printz, A. Wick, A. Daigh, R. Limb. 2014. Successful reclamation of lands disturbed by oil and gas development and infrastructure construction. North Dakota State University Extension Service Pub. R1728.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook.Energy Information Administration, www.eia.doe.gov/oiaf/1605/coefficients.html

5.0 Signatures

The services performed by Wenck staff for this project have been conducted in a manner consistent with the degree of care and technical skill appropriately exercised by professionals currently practicing in this area under similar time and budget constraints. Recommendations and findings contained in this report represent our professional judgment and are based upon available information and technically accepted practices at the present time and location. Other than this, no warranty is implied or expressed.

Project Manager, Sara Simmers, and Environmental Scientist, Luke Menden, prepared the report.

_____ _11/30/18_____
Sara Simmers, Project Manager/Scientist Date

_____ _11/30/18_____
Luke Menden, Environmental Scientist Date

Tables

1. Observation Point Coordinates

Point #	Latitude	Longitude	Date
1	47.80797	-103.170188	20-Jun-18
2	47.80799	-103.170348	20-Jun-18
3	47.151114	-103.214176	20-Jun-18
4	47.149225	-103.21515	20-Jun-18
5	47.149667	-103.214934	20-Jun-18
6	47.150877	-103.214334	20-Jun-18
7	46.88484	-103.20596	12-Jul-18
8	46.8596	-103.23127	12-Jul-18
9	46.85963	-103.22839	12-Jul-18
10	46.859591	-103.228333	12-Jul-18
11	46.8596	-103.22678	12-Jul-18
12	46.94859	-103.21168	29-Oct-18
13	46.9462	-103.21192	29-Oct-18

Appendix A

Photographs

Photo 1. Facing: South. Location: 47.80797, -103.170188. Start of topsoil stripping by Jones Contractors on the North Segment. You can see where the dozer scraped a line in the ground for the topsoil pile to be placed, to stay in the ROW.

Photo 2. Facing: South. Location: 47.80799, -103.170348. Start of topsoil stripping. Topsoil stockpile being created. Spotters ensuring stockpile remain in ROW.

Photo 3. Facing: Northwest. Location: 47.80796, -103.17023. Topsoil stripped to depth of around 8 in. Subsoil reached with small amount of topsoil remaining will be leveled by final pass of grader.

Photo 4. Facing: South. Location: 47.151114, -103.214176. Dozer marking edge of ROW for start of topsoil stripping by Jomax on the South Segment.

Photo 5. Facing: North. Location: 47.149225, -103.21515. Start of topsoil stripping on South Segment. West half of ROW stripped first.

Photo 6. Facing: South. Location: 47.150877, -103.214334. West half of ROW stripped. Final topsoil stockpile location on east end of ROW.

Photo 7. Facing: North. Location: 47.149667, -103.214934. Subsoil beginning to show at current grade. Depth of around 8 inches.

Photo 8. Facing: East. Location: 46.8596, -103.23127. Two stockpile mounds visible at hilltop at the Transfer Segment. Topsoil on outside (right) with the subsoil pile touching.

Photo 9. Facing: East. Location: 46.85963, -103.22839. Closer view of subsoil and topsoil stockpiles.

Photo 10. Facing: South. Location: 46.94859, -103.21168. Topsoil stripping on the South Segment. Stockpile stored on west side of ROW.

Photo 11. Facing: South. Location: 46.94859, -103.21168. Topsoil stripping on South Segment. Grader making last pass to level ROW.

Responsive partner.
Exceptional outcomes.