

2022 Exploratory Drilling AML Project

Contractor: Earth Energy & Water Systems, Inc.

Contract Number: AM-863-22

Contract Bid Amount: \$925,000.00

Total Project Cost: \$926,690.00

2022 eAMLIS Project Information						
Project	Problem Area Number & Name	Project Start Date	Project End Date	Working Days	Project Cost	Estimated Population Impacted
Exploratory Drilling	ND024/Binek	5/18/2022	6/2/2022	10	\$143,684.47	285 people based on 2021 vehicle count on Lehigh Road
Exploratory Drilling	ND004/Buechler Knorr	6/23/2022	7/06/2022	9	\$83,821.07	425 people based on 2020 vehicle count on ND Highway 23
Exploratory Drilling	ND019/Garrison	7/07/2022	8/04/2022	20	\$260,726.60	4250 people based on 2021 vehicle count on McLean County Highway 15
Exploratory Drilling	ND014/Beulah	8/16/2022	9/16/2022	22	\$391,106.22	2130 people based on 2020 traffic count on ND Highway 200
Exploratory Drilling	ND528/Bowman	5/16/2022	5/16/2022	1	\$21,633.02	258 people based on the 2020 Census
Exploratory Drilling	ND029/Noonan	8/10/2022	8/11/2022	1	\$25,718.62	315 people based on 10% of deer tags in the hunting unit
Decommissioning of Monitoring Wells	ND0528/Scranton	5/16/2022	5/16/2022	1	\$21,633.02	NA

AML Background

The Public Service Commission administers the Abandoned Mine Lands (AML) Program on behalf of the State of North Dakota. The State AML Program was approved by the U.S. Department of the Interior in 1981 under the authority of the Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87, Title IV). Program funding comes from a federal reclamation fee on coal that has been mined in the United States since the late 1970's. These fees are placed into the AML fund and the money that North Dakota receives from this fund is used to eliminate existing and potential public hazards resulting from abandoned surface and underground coal mines.

Scranton Site

The North Dakota Abandoned Mine Lands Division conducted a drilling and grouting project in Scranton in 2013. Monitoring wells were installed in that project to monitor groundwater levels and collect samples. These monitoring wells were no longer needed and were removed in the 2022 Exploratory Drilling AML Project.

Dickinson Site

Six abandoned underground coal mines are documented in the area around Lehigh Road and Lehigh Drive, southeast of Dickinson. Sinkholes continually form as the underground mine sporadically collapses. The AML Division has conducted numerous sinkhole filling projects and eight phases of drilling and grouting projects.

In 2003 drilling and grouting halted as there was a concern of phenols in the groundwater generated from industrial wastewater. Mine maps indicated important infrastructure was most likely undermined and hazardous sinkholes continued to form (**Figure 1**). The AML Division worked with the ND Department of Environmental Quality (NDDEQ) to test monitoring wells. No contamination was found allowing drilling and further monitoring to resume.

The 2022 Exploratory Drilling Project continued drilling where it paused in 2003. Drilling was needed to confirm the extent of the mines. Grout has been pumped under the shoulders of both Lehigh Road and Lehigh Drive during previous drilling and grouting projects. Confirmation drilling in the 2022 Exploratory Drilling Project confirmed that grout had filled many mine voids along said roads. Drilling also helped identify several abandoned underground mine workings in new locations (**Figure 2**). Additional drilling and grouting reclamation work is planned for this site.

Velva Site

AML staff received a call in September 2021 from a concerned landowner. The home is near multiple abandoned underground and surface lignite coal mines. AML staff visited the site and found some depressions that looked like formerly filled sinkholes. Additionally, there was a large, barricaded steel and concrete structure near the house that looked like it could be blocking a possible mine entrance. Drilling revealed poor-quality coal and no mine workings (**Figure 3**). No additional work is planned at this location.

Mobilization to the Velva area created an opportunity for confirmation drilling at a site along Highway 23, southwest of Velva. More than 6,700 cubic yards of grout were pumped at this site in 1994 and 2003 projects. Confirmation drilling at this location encountered grout in the mine voids at several locations, which indicates the 1994 and 2003 projects were effective. Only seven holes encountered unfilled mine voids. No future work is currently planned for this location.

Garrison Site

Three known abandoned underground lignite coal mines are located approximately one mile south of Garrison. The Rupp, Kunkel, and Garrison Coal mines all operated here in the 1910s and 1920s. Although we have some records of the area, we are missing a significant portion of the information that is sometimes documented in mine maps. The legacy of these mines is exhibited through sinkholes.

The AML Division had conducted multiple sinkhole filling projects in the area and four phases of drilling and grouting. A gasoline leak from an underground storage tank at a nearby gas station was discovered while drilling in 2005. This caused work to be halted until the spill was remediated under the guidance of the NDDEQ. Exploratory drilling resumed in 2021 and it identified hazardous underground mine voids near public roads and homes. The 2022 project created a more complete picture of the extent of the

abandoned underground mines. The 2022 exploratory drilling in Garrison was done prior to the 2022 Garrison Phase 5 AML Drilling and Grouting Project. The 2022 drilling showed the extent of the abandoned underground mines in this area is larger than anticipated (**Figure 4**).

Noonan Site

In 2020 the AML Division conducted a foamed sand injection project at an abandoned underground mine on North Dakota Game and Fish land near the town of Noonan (**Figure 5**). The 2022 project intended to do additional testing on foamed sand material using the standard penetration testing and split barrel sampling. Results indicated that the foamed sand was able to penetrate small mine workings. No future work is planned at this site.

Beulah Site

More than 50 abandoned coal mines have been identified within 20 miles of the cities of Beulah and Zap. The Knife River Coal Mine was the largest abandoned underground mine in the area. It was first developed under the name Black Diamond Mine in 1915. In the late 1950s Knife River took over strip-mining operations. Since 1992, sixteen phases of drilling and grouting projects have been conducted in the Beulah/Zap area.

Drilling began near where grout and foamed sand were pumped in the 2021 Beulah/Zap Phase 16 AML Project. Drilling revealed underground mine workings had been filled with grout and sand slurry. Other areas in the ditch of Highway 200 were drilled and a combination of grout and sand slurry was found in mine voids. A nearby rural residence was also included in this project. There have been sinkholes filled near the residence. The site had been previously pumped with grout. The latest drilling here revealed mostly unmined areas, but a few mine voids were discovered.

Fifty feet of coring was conducted at the Beulah site. Two core samples were collected in the north ditch of Highway 200 where grouting took place in 2021. Both cores found solid grout (**Figure 6**). The remaining core samples were taken in the driveway of the rural residence. Those cores also showed solid grout.

Drilling Statistics

Dickinson Site

Working Days	10 3909+5742
Feet drilled per day	965
Feet cased per day	265
Total cased holes	58
Total holes drilled	160
Total feet drilled	9,651

Velva

Working Days	9
Feet drilled per day	680
Feet cased per day	66
Total cased holes	7
Total holes drilled	78
Total feet drilled	6,119

Garrison

Working Days	20
Feet drilled per day	1004
Feet cased per day	188
Total cased holes	108
Total holes	404
Total feet drilled	20,072

Beulah

Working Days	22
Feet drilled per day	1307
feet cased per day	274
Feet cored	50
Cased holes	89
Total holes	290
Total feet drilled	28,750

Noonan

Working Days	1
Feet Drilled	88

Total Drilling Statistics

Working Days	62
Total feet drilled	64,680
Total feet cased	12,3045
Project Dates	5/16/2022 to 9/16/2022



Figure 1: A sinkhole in the ditch of Lehigh Road that formed in the spring of 2022. Drilling near this sinkhole located additional underground mine voids.



Figure 2: The white pin flags indicate drillhole locations. The pink whiskers indicate a drillhole encountered a mine void. Voids are cased with schedule 40 PVC pipe. This area is a driveway to an industrial business off Lehigh Road.



Figure 3: Drilling around a rural residence southwest of Velva.



Figure 4: The drill rig is facing north in the east ditch of McLean County Highway 15. Buildings in Garrison can be seen in the background.



Figure 5: The Noonan site has both abandoned underground and surface coal mines. The hills behind the drill rig are spoil piles from historic surface mines.



Figure 6: The drillers are opening the core barrel revealing solid grout and coal.