

Summary Report
North Dakota Public Service Commission
2014 Dickinson-Bowman Emergency Project
Contract AM-679-13

The North Dakota Public Service Commission administers an Abandoned Mine Lands (AML) Reclamation Program on behalf of the State of North Dakota. The AML program is charged with eliminating existing and potential public hazards resulting from abandoned surface and underground coal mines. It is funded by a production fee on lignite coal mined in the state.

The 2014 Dickinson-Bowman Emergency Project was conducted to repair dangerous sinkholes caused by underground mine collapse along Lehigh Road near Dickinson and near the intersection of 81st Street and 146th Avenue north of Bowman, ND. The initial Dickinson sinkhole was reported on January 31, 2014 and the Bowman sinkholes were reported on February 19, 2014. Safety fences were constructed around the sinkholes to protect the public and sinkhole filling was conducted after the spring thaw. Sinkhole filling began May 1 and was completed June 16, 2014. The contractor was Pleasant and Sons Construction of Greenville, KY, who was already under contract. The contract cost for this work was \$23,530.

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Bowman sinkhole inspection with representatives from TransCanada and City of Bowman on March 13, 2014

**North Dakota Public Service Commission
2014 Dickinson-Bowman Emergency
Chronology of Events**

- Jan. 31, 2014** Lee Messer, Southwest Water Authority, called Bill Dodd to report a dangerous sinkhole on the east side of Lehigh Road. He said the sinkhole had completely severed a rural water line but that it had been temporarily repaired and his crew had placed a safety fence around the hole. He said the hole was very deep and dangerous.
- Feb. 3, 2014** Bill Dodd and Matt Fischer, PSC, inspected the site. We met with Lee Messer, Tim Ridl (Roughrider Electric) and Al Heiser (Stark County) at the site. The sinkhole was 30 feet long and 26 feet wide with an average depth of 14 feet. Frozen conditions precluded repairs until spring, but Lee and Al agreed to monitor the hole and make sure it was fenced and barricaded so no one would fall in.
- Feb. 19, 2014** Todd Hofland, City of Bowman called Bill Dodd to report a dangerous sinkhole about 4 miles north of Bowman near the city landfill and very near a public road. He said the city would erect a safety fence around the sinkhole. The sinkhole was also reported to ND Emergency Services because it had severed a fiber optic telecommunication line and occurred near a natural gas pipeline.
- Feb. 20, 2014** Matt Fischer and Joan Breiner, AML Division, inspected the Bowman sinkholes with Todd Hofland. They found two sinkholes with a narrow land bridge between them. The southern opening was 48 feet X 12 feet with an average depth of 21 feet and the northern opening was 38 feet X 20 feet with an average depth of 18 feet. These sinkholes had severed a fiber optic telecommunication line and were within 100 feet of the TransCanada Bison Pipeline, a 30-inch high pressure natural gas pipeline, and also two public roads. Frozen conditions precluded sinkhole repairs until spring, but a safety fence was installed around the holes and Todd agreed to monitor it.
- April 21, 2014** Matt Fischer conducted a preliminary survey of the soil and concrete piles at the Dickinson and Bowman sites.
- Mar. 13, 2014** Joan Breiner and Bill Dodd met with representatives of TransCanada and the City of Bowman to inspect the sinkholes and their proximity to the pipeline and discussed how to best protect the public.
- Mar. 25, 2014** Emergency documentation was e-mailed to OSM-Casper Field Office for the Dickinson and Bowman sinkholes.
- Mar. 28, 2014** Emergency concurrence and Authorization to Proceed for Dickinson and Bowman sinkholes was received from OSM.

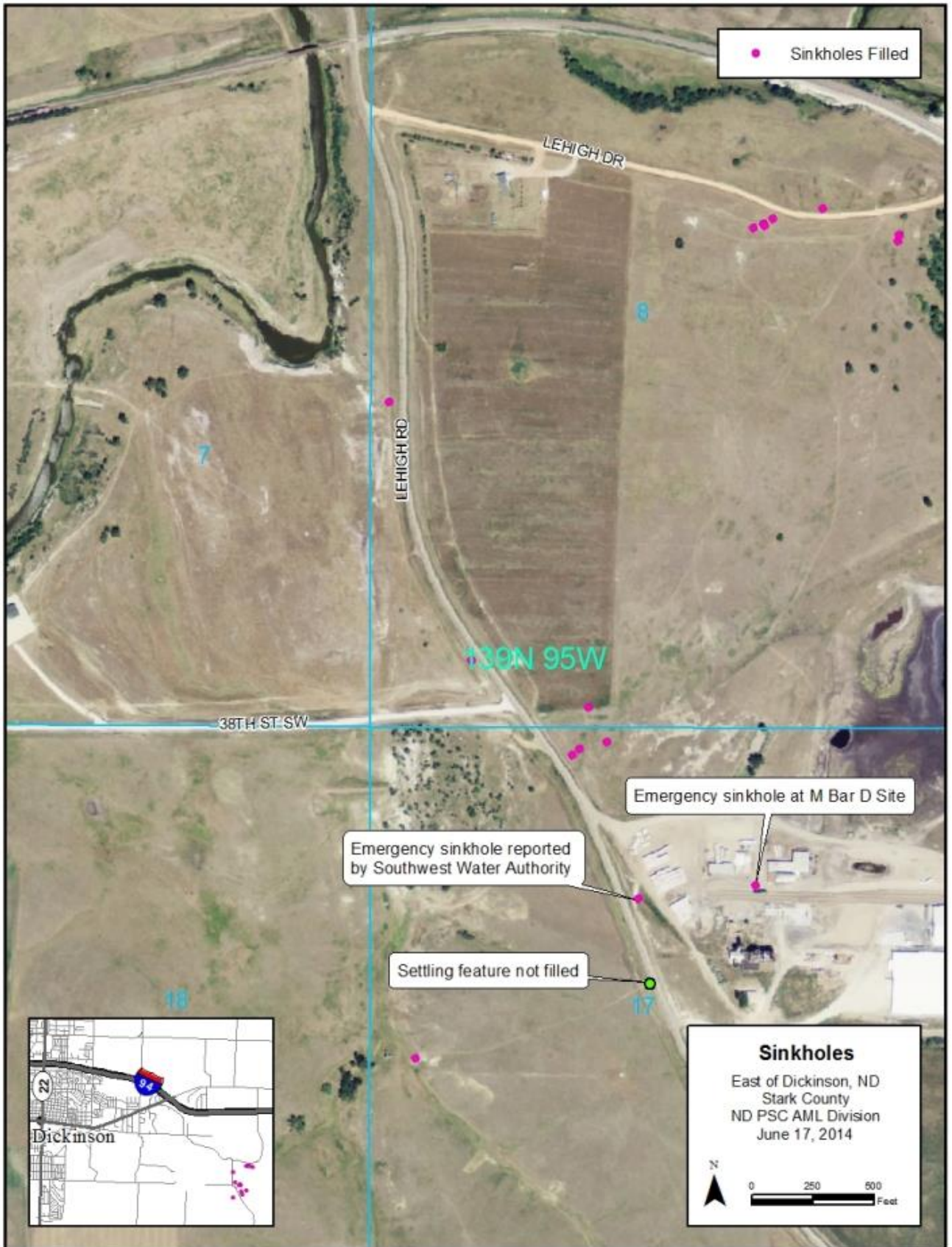
**North Dakota Public Service Commission
2014 Dickinson-Bowman Emergency
Chronology of Events (Continued)**

- May 1, 2014** Pleasant & Sons Construction of Greenville, KY, began sinkhole filling work near Dickinson. An additional sinkhole had occurred in the west ditch of Lehigh Road and 14 other sinkholes were discovered within 100 feet of the rights-of-way of Lehigh Road and Lehigh Drive.
- May 2, 2014** One of the sinkholes, located south of Lehigh Drive, had a fiber optic cable exposed in it. This required a one-call emergency locate call in order to identify and mark the line.
- May 3, 2014** Sinkhole filling was completed at the Dickinson site. Sixteen sinkholes were filled with approximately 650 cubic yards of soil materials. All areas were tilled and seeded.
- May 5, 2014** Sinkhole filling began at the Bowman Site. The sinkholes had collapsed farther and there was an additional (third) sinkhole in the original cluster. Fill material included waste concrete and soil materials (clay) taken from the Bowman Landfill. Bowman City personnel showed us three other nearby smaller sinkholes.
- May 10, 2014** Sinkhole filling was completed at the Bowman Site. Approximately 1300 cubic yards of waste concrete and clay was used to fill the sinkholes. All areas were tilled and seeded.
- May 14, 2014** Matt Fischer and Bill Dodd conducted a final survey of the soil and concrete piles at the Dickinson and Bowman sites to determine the volumes of materials used to fill the sinkholes.
- May 25, 2014** Payment was approved for an invoice submitted by Pleasant & Sons Construction in the amount of \$21,525.00 for emergency sinkhole filling at Dickinson and Bowman. The contract cost for the sinkhole filling at Dickinson was \$7692.50 and the contract cost for the sinkhole filling at Bowman was \$13,832.50.
- June 3, 2014** Troy Gust of M-Bar-D Rail Tech called Jim Deutsch to report a dangerous sinkhole on the M-Bar-D plant site near Dickinson.
- June 5, 2014** Joan Breiner and Matt Fischer inspected the sinkhole report with M-Bar-D personnel. The sinkhole was approximately 36 feet long, 13 feet wide and 6 feet deep. About 20 feet of the length of the sinkhole was undercut and covered by a thin veneer of crushed rock. The sinkhole was about 20 feet north of a rail spur with tankers containing hydrochloric acid.

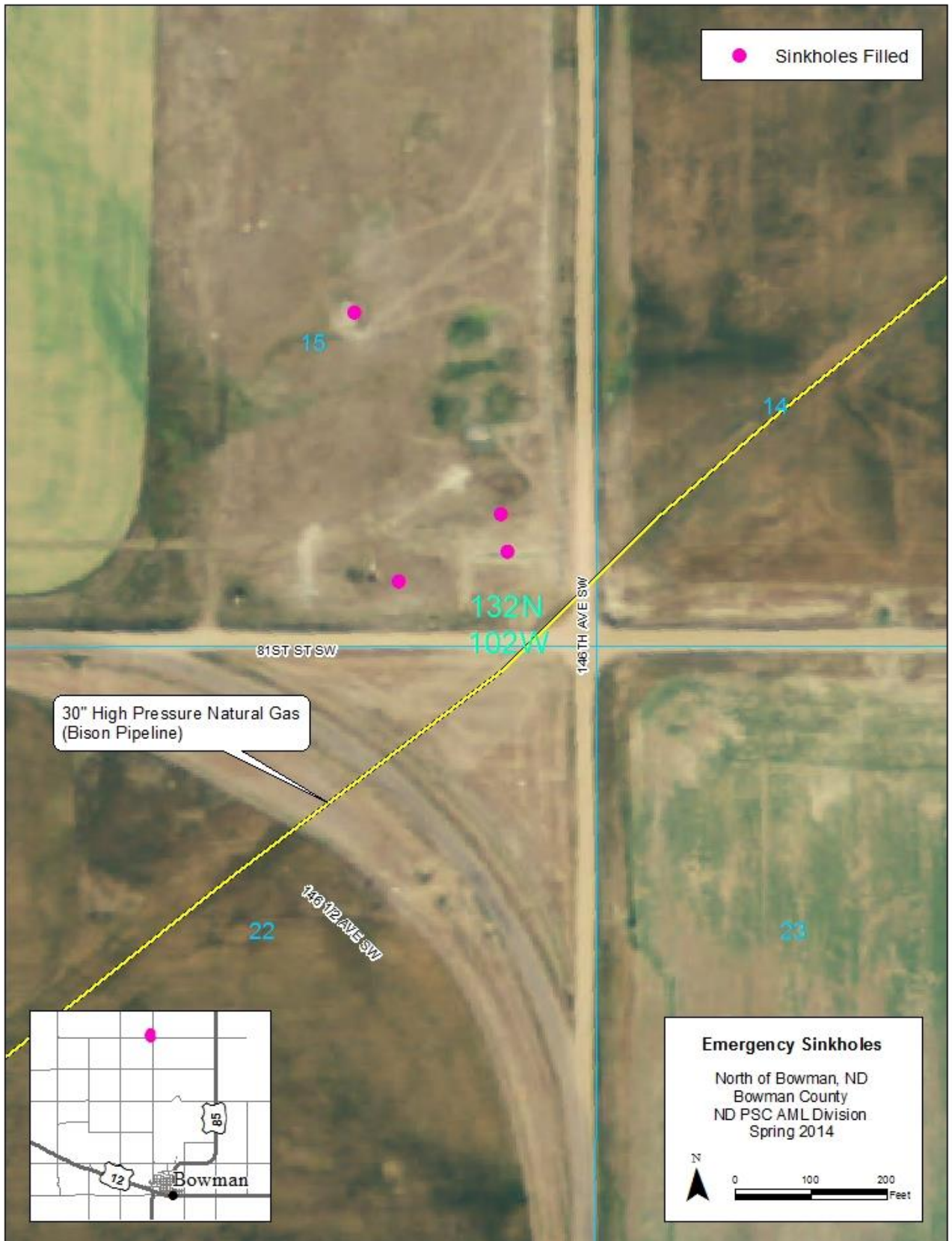
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Chronology of Events (Continued)**

- June 11, 2014** The sinkhole was inspected again during an OSM oversight inspection. John Sieving, OSM, agreed the sinkhole constituted an AML emergency and should be repaired as soon as possible.
- June 16, 2014** Sinkhole filling was completed at the Dickinson (M-Bar-D) site. The sinkhole was excavated and approximately 100 cubic yards of soil materials were required to fill the hole. M-Bar-D placed road gravel over the repaired sinkhole and dragged it.
- June 17, 2014** Bill Dodd made a final inspection of the repaired sinkhole. While there, he noticed a red flag along the west side of Lehigh Road. The flag was marking a settling feature approximately 18 inches in diameter and 6 inches deep on the edge of the asphalt. Bill called Al Heiser, the Stark County Road Superintendent and Al said he had just marked it that morning. Al was concerned the settling could develop into a sinkhole and affect the safety of the road. Al agreed to fill the settling feature with gravel or pea rock and continue to monitor the area for additional settling.
- June 20, 2014** Payment was approved for an invoice submitted by Pleasant & Sons Construction in the amount of \$2000 for the additional emergency sinkhole filling at the M-Bar-D site at Dickinson, bringing the total contract cost for the 2014 Dickinson-Bowman Emergency Project to \$23,530.

Dickinson Site Location Map



Bowman Site Location Map





2014 Dickinson-Bowman Emergency, Dickinson (Lehigh Road) Site

This shows a dangerous sinkhole caused by mine collapse in the east ditch of Lehigh Road southeast of Dickinson, ND. Southwest Water Authority reported this sinkhole on January 31, 2014, after it completely severed a rural water line. Southwest Water repaired the line and erected a safety fence around the hole to protect the public.



2014 Dickinson-Bowman Emergency, Dickinson (Lehigh Road) Site

This shows the filling of the sinkhole on May 1, 2014. The sinkhole was approximately 30 feet long and 26 feet wide with an average depth of 14 feet. The historic Lehigh Briquetting Plant is in the background.



2014 Dickinson-Bowman Emergency, Dickinson (Lehigh Road) Site

This shows the same area after the sinkhole was filled. It took 31 truckloads of coal waste and dirt to fill it. The area was then tilled and seeded. The contractor, Steve Pleasant, was smiling as he walked across this area.



2014 Dickinson-Bowman Emergency, Dickinson (Lehigh Road) Site

This shows another sinkhole that developed on the west ditch of Lehigh Road in late April 2014. It was more than 6 feet in diameter just below the surface and 10 feet deep, and took 4 truckloads of dirt to fill. Sixteen dangerous sinkholes were filled near Lehigh Road and Lehigh Drive at an approximate cost of \$7692.50.



2014 Dickinson-Bowman Emergency, Bowman Site

This photo shows one of the two clustered sinkholes at the Bowman site when it was initially inspected on February 20, 2014. This one was about 38' X 20' with an average depth of 18', and the other was about 48' X 12' with an average depth of 21'.



2014 Dickinson-Bowman Emergency, Bowman Site

By the time work began on May 5, additional caving had occurred and a third sinkhole, about 25' X 15' and 20' deep, had formed in the cluster as shown in the foreground. City personnel reported three additional smaller sinkholes and a settling feature nearby.



2014 Dickinson-Bowman Emergency, Bowman Site

After saving topsoil and excavating the sinkholes to the extent possible, the holes were filled with concrete waste and clay taken from the Bowman Landfill. Approximately 568 cubic yards of concrete and 672 cubic yards of clay were used - more than 150 truckloads in nearly 5 days of hauling. Additional topsoil was saved while filling the holes.



2014 Dickinson-Bowman Emergency, Bowman Site

This picture was taken May 14 after the cluster of three holes were filled, topsoil was replaced and the area of approximately 100' X 75' was tilled and seeded.



2014 Dickinson-Bowman Emergency, Bowman Site

This shows the filling of a smaller sinkhole at the Bowman site, located about 350 feet northwest of the large ones. It was about 22' in diameter and 5-6' deep and full of water. A trench was cut to drain out the water and it was filled with 10 truckloads of clay.



2014 Dickinson-Bowman Emergency, Bowman Site

This picture shows the same area after the sinkhole was filled but before tilling and seeding. The area was still pretty soft, so painted laths were put around it to alert people not to drive over it. The approximate cost of all work at the Bowman Site was \$13,832.50.



2014 Dickinson-Bowman Emergency, Dickinson M-Bar-D Site

This shows a sinkhole reported June 3, 2014 on the M-Bar-D plant site southeast of Dickinson. It was about 10 feet in diameter at the surface but much larger just beneath the surface. It was about 20 feet away from a railroad spur with tanker cars containing hydrochloric acid..



2014 Dickinson-Bowman Emergency, Bowman Site

This is a close-up of the same sinkhole. Just beneath the road surfacing material, the hole was approximately 36 feet long and 13 feet wide with an average depth of 6 feet and maximum depth of 15 feet.



2014 Dickinson-Bowman Emergency, Dickinson M-Bar-D Site

This photo, taken June 17, 2014, shows the M-Bar-D sinkhole site after it was filled and road gravel was replaced. Approximately 100 cubic yards of soil materials were needed to fill the hole and the contract cost for this additional work was \$2000.



2014 Dickinson-Bowman Emergency, Dickinson Lehigh Road Site

This shows a small settling feature on the west side of Lehigh Road about 700 feet south of the entrance to M-Bar-D. It was about 18 inches in diameter and 6 inches deep. Stark County Road Superintendent, Al Heiser, agreed to fill the hole with gravel and continue to monitor the area for additional settling