

UPDATE

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INJECTION AND SPREAD OF COAL MINE SLURRY IN AN ABANDONED COAL MINE

An effluent produced from the processing of raw mined coal ore is a dark grey – black slurry (aka coal or mine slurry). The mine slurry is typically deposited of either in a coal slurry pond on the ground surface, or injected underground into an abandoned room and pillar coal mine. At this project site, coal slurry injection was performed in abandoned coal mine at a depth of roughly 230 ft deep. The permitted areas designated



FIGURE 1 PERMITTED INJECTION AREAS IN THE ABANDONED COAL MINE

to be filled in with mine slurry waste are shown in Figure 1. The injection hole setup on the surface is shown in Figure 2. Also, because the slurry contains a significant amount of water to efficiently pump and inject the coal waste much of it bleeds out upon deposition of the slurry. Therefore,



FIGURE 2 SLURRY INJECTION HOLE SETUP

in order to fit a greater volume of waste in the old workings, wells were installed into the mine void of each injection area to pump out this bleedwater and allow more slurry to be injected. The decant hole setup on the ground surface is shown in Figure 3.

These permitted injection areas shown in Figure 1 mainly rely on old block mine seals to restrict the flow of the injected slurry into non-permitted areas.

These mine seals were installed in abandoned portions of the mine to close off these areas of the mine from the need for ventilation and to mitigate the effects of an explosion from gas buildup propagating into the active areas of the mining. Therefore, these mine seals were not built to withstand downhole hydrostatic pressure from the slurry injection which comes from the pumping head and mine depth. Moreover, by the time of slurry injection occurred these mine seals were old, and have not been maintained, and have deteriorated,



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Consequently, these seals were breached causing the slurry to spread into unpermitted areas. This was also evident from the volume of deposited slurry pumped into the mine far exceeding the estimated storage capacity for permitted injection areas.

To verify and estimate the extent of the spread of mine slurry, a number of verification borings were drilled outside the permitted area to sample the mine void interval and determine if mine slurry was present. This was done with a sampling tube which was pushed into the clay mine floor several inches to provide a plug so the slurry would not slip out of the tube upon retrieval. Figure 4 shows the slurry that was pushed out of one of these sampling tubes. The measured moisture content and wet density of the sampled mine slurry were 23 to 88% (60% average) and 84 to 95 pcf (90 pcf average).

Based on the above borehole investigation campaign the limit of the slurry spread was extrapolated and is shown in Figure 5. It is estimated that the slurry had spread up to roughly 6,000 ft beyond the breached seals.



FIGURE 3 SURFACE DECANT HOLE SETUP

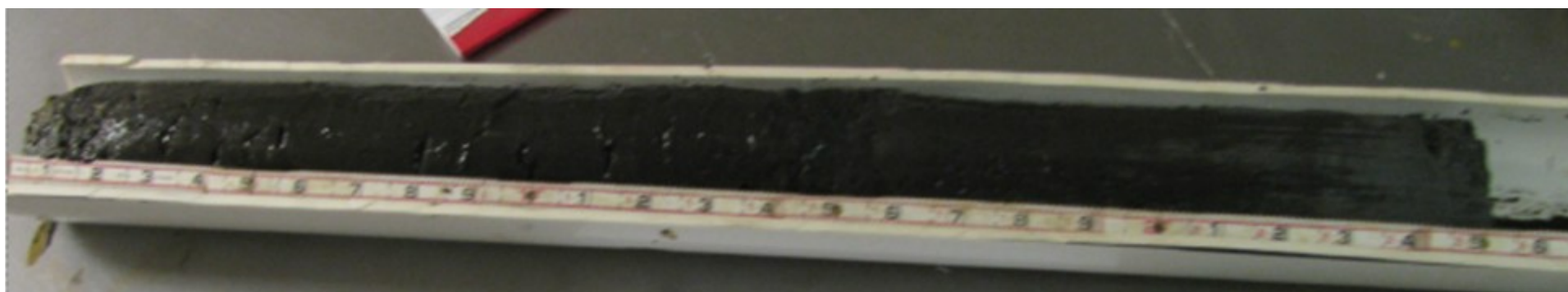


FIGURE 4 EXTRUDED SAMPLE OF COAL SLURRY TAKEN FROM IN THE MINE OUTSIDE OF THE INTENDED INJECTION AREA

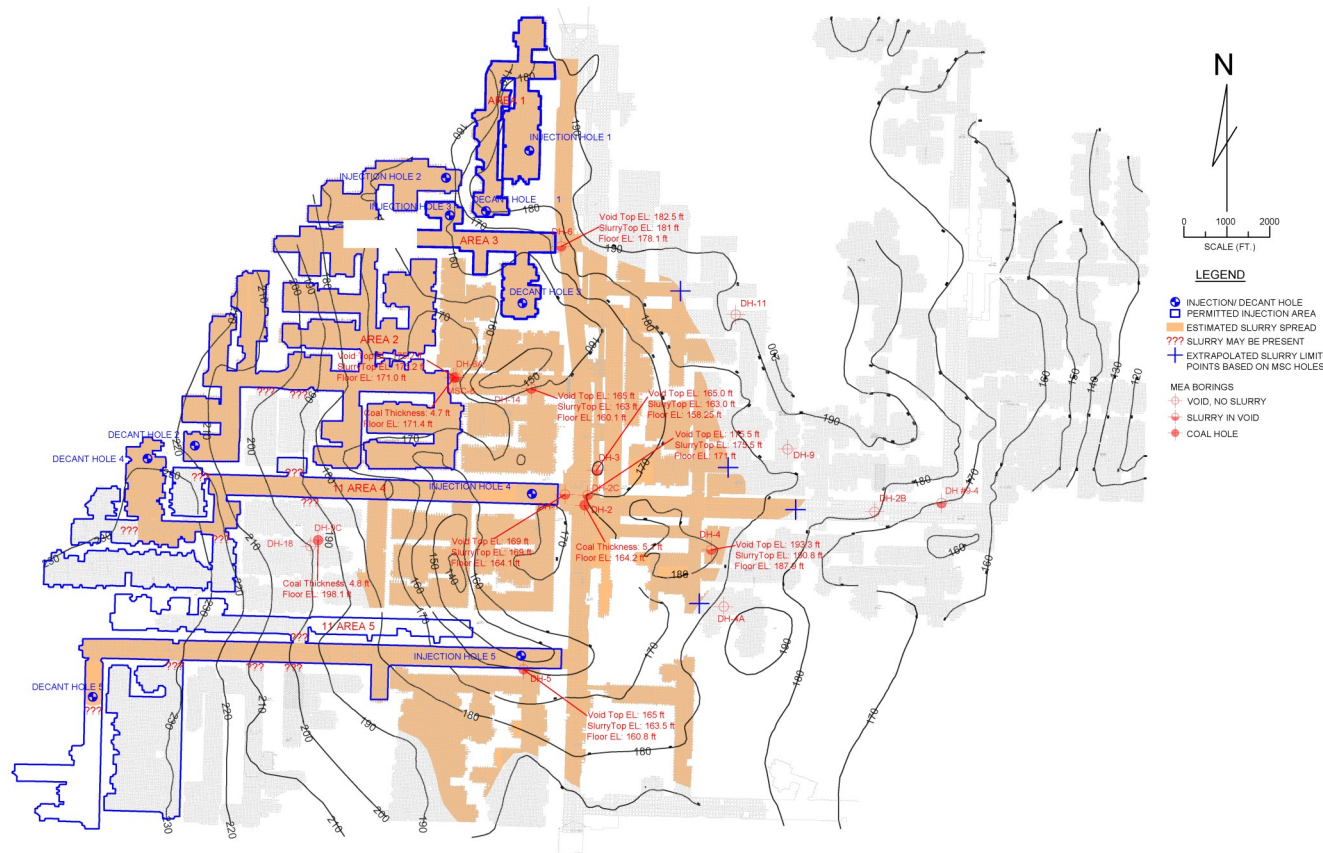


FIGURE 5 ESTIMATED SPREAD OF COAL SLURRY INJECTED INTO THE ABANDONED COAL MINE

Other MEA Publications that may be of Interest:

UPDATE #24 — [Anatomy of Grouting Mine Voids](#)

UPDATE #36— [Moisture Softening Effects on Mine Floors](#)

UPDATE #54— [Handling Potential Mine Subsidence at a Project Site](#)

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FOR MORE INFORMATION: There is a significant amount of additional information that is available on the above subject. For more information, please contact MEA at the address listed below.

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