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**McDonald, PA Carbon Dioxide Mine Gas Investigation and Remediation**

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On September 7<sup>th</sup>, 2021, the Office of Surface Mining Reclamation and Enforcement (OSMRE) was asked to provide technical assistance by the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation (PADEP-BAMR) to investigate elevated CO<sub>2</sub> levels with low O<sub>2</sub> levels at a residence. The site was a single-family home on approximately one acre plot of land. The goal of this investigation was to remediate the indoor air quality.

Remediation would be considered successful if the O<sub>2</sub> levels remain above the minimum level required by the Mine Safety and Health Administration (MSHA); 19.5% by volume for 30 days. Long-term gas monitoring was discontinued on May 20, 2022. At that point, the O<sub>2</sub> levels remained above 19.5% for approximately 30 days (March 25 – April 14 and May 13 – 20, 2022).

It appears the combination of filling the mine void space with grouting, adding de-gas pipes (boreholes), and installing exhaust ventilation fans on the de-gas pipes provided new pathways for the CO<sub>2</sub> gas to ventilate to the atmosphere. This was effective at remediating the relatively large (approximately one acre) site. The key factor was the installation of the exhaust fans on the de-gas pipes. After the installation of the exhaust fans on the de-gas pipes, O<sub>2</sub> levels remained above 20%. It is hypothesized that the drilling and grouting alone wasn't as successful as it has been in the past due to the larger size of this property (i.e. more mine void space under the property).

This successful CO<sub>2</sub> gas remediation was unique, since historically PADEP-BAMR has completed many successful CO<sub>2</sub> gas remediation projects by only filling in the mine void space by way of boreholes with grouting and/or sealing cracks in a basement/garage at smaller sites approximately 0.5 acres.

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