

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029**

SUBJECT: Engineering Evaluation/Cost Analysis Approval Memo
Clearfield CO2 Site
Morrisdale, Clearfield County, Pennsylvania

FROM: Ann DiDonato (3SD31)
On-Scene Coordinator

TO: Linda Dietz, Acting Director (3SD00)
Superfund and Emergency Management Division

THRU: Michael Towle, Chief (3SD30)
Preparedness and Response Branch

The purpose of this memorandum is to request approval to proceed with an Engineering Evaluation/Cost Analysis (EE/CA) for a non-time-critical removal action (NTCRA) at the Clearfield CO2 Site located in Morrisdale, Clearfield County, Pennsylvania (the Site). The purpose of the NTCRA is to address high levels of carbon dioxide (CO2) within homes built upon a former coal mine. The CO2 is most likely being generated from chemical reactions between acidic mine waters and naturally deposited carbonate rock formations and alkaline amendments placed in the mine during reclamation activities. Lime amendments are traditionally added during reclamation process to mitigate the impacts of the acid mine drainage (AMD) into waterways.

The U.S. Environmental Protection Agency (EPA) will prepare the EE/CA and take public comment on the EE/CA. EPA will then select a removal response alternative, which will be documented in an Action Memorandum. EPA has consulted, and will continue to consult, with the Pennsylvania Department of Environmental Protection (PADEP).

I. Site History/Background

Coal mining of the bituminous coal seams in Clearfield County commenced as early as 1785. Large scale deep coal mining activities in Clearfield County Pennsylvania have taken place from the 1800's with the deep mines being converted to strip mines around World War II. Coal mining began to decline in the 1970's; however, several strip-mining operations continue in Clearfield County.

According to several studies on mines and surface water impacts, AMD issues with Alder Run, the stream adjacent to the former mine were identified as early as 1955. A report on possible mitigation of impacts to Alder Run and solution for reclamation of mines in the watershed was issued in 1970. Permitted mining continued the area until 1991 and ceased at the bankruptcy of the Avery Coal Company.

Mine reclamation activities appear to have taken place in three phases according to the available documents. Between 1978 and 1984, Thompson Brothers Coal Co. mined the permit area and completed reclamation activities. Requests to transfer the permit from Thompson Brothers to Avery Coal began in 1984/1985, with full transfer of the permit appears to have taken place around 1987. Avery Coal continued mining in the area and completed some reclamation activities between 1984 and 1991; however, Avery Coal entered into bankruptcy following the cessation of mining in 1991. In 1992, PA DEP declared Avery's bonds forfeit. After PA DEP claimed the bonds, PA DEP contractors apparently completed the final reclamation of the mine, and the property was subdivided and sold for residential development.

1.1 PREVIOUS ACTIONS

In January 2011, a resident who purchased a portion of the former mine and constructed a new home in 2006 contacted PA DEP with concerns about high levels of CO₂. Within a few years of the construction of the home, the residents became ill and subsequently learned that the cause was related to high levels of CO₂. The year before, the property owners had contacted the Pittsburgh based Office of Surface Mining - Reclamation Enforcement (OSM), which is a federal agency and a division of the US Department of Interior, to request methods to mitigate the CO₂ in their home. Subsequently, they implemented several mitigation methods included a 'reverse radon' system, which solved the issue temporarily. Between 2011 and 2018, PA DEP and OSM responded to the resident's request and visited the home to monitor for elevated levels of CO₂. PA DEP made one recommendation to alleviate the levels of CO₂, which the homeowner completed.

OSM's involvement culminated with a Technical Assistance Report issued in February 2019, which detailed elevated levels of CO₂ in the home and in the surrounding property and noted that lower barometric pressure corresponded with higher CO₂ levels. OSM, through previous email correspondence/face to face consultation and the 2019 official report, made a total of 11 recommendations to alleviate the elevated CO₂ levels, of which the homeowner completed all but two of the recommendations. All recommendations temporarily lowered the CO₂ levels in the home but eventually failed to permanently solve the problem.

II. Current Status

On September 30, 2019, the EPA received a call from the Emergency Response Manager for PA DEP's North Central Office. The homeowners had called the PA DEP office requesting assistance with rebounding high levels of CO₂ in his home. EPA requested the Agency of Toxic Substances and Disease Registry/Centers for Disease Control (ATSDR) to contact the resident while the OSC gathered some background information from PA DEP.

During their call, ATSDR ascertained that the issue had been going on for some time and that the resident had spent many years implementing recommendations by PA DEP and OSM. Despite implementing the majority of the recommendations, the levels of CO₂ had recently begun to rise again, and the resident was concerned that the construction of a new AMD treatment plant for Alder Run was the cause of the most recent issue. Additionally, an unidentified odor was recently detected in the home causing some serious concern as one of the homeowners has a heart condition, which was exacerbated by the elevated CO₂.

EPA determined that a Site visit and meeting with the resident was necessary. During October 2019, EPA and START completed several Site visits and monitored indoor air for CO₂, oxygen (O₂), ammonia (NH₃), volatile organic compounds (VOCs), LEL, etc. at the primary home and in several other homes. Levels of CO₂ up to approximately 2000 to 4000 ppm were detected in the basement living areas. Due to several failures of the O₂ sensors in equipment on separate days, a more thorough monitoring event, which would include additional homes on the former mine, was planned for the following month.

On November 14 and 15, 2019, EPA completed an additional monitoring event, which included the use of a CO₂ meter, in five homes located on or adjacent to the former strip mine. Following this event and the detection of over 6000 ppm of CO₂ in one additional home, EPA requested permission from the residents to complete 3 days of SUMMA canister air sampling and a three-Day continuous monitoring event, which would be completed with the assistance of EPA's Environmental Response Team (ERT). Four of the homeowners agreed to allow the sampling and one homeowner declined further sampling and/or assessment.

On November 25 and 26, 2019, the OSC met with PA DEP's Moshannon mining office to review the file for the coal mining permit area. The mine had numerous violations over the years and it appeared that the former mine was continually out of compliance with PA DEP and the former Pennsylvania Department of Environmental Resources (PA DER) for various reasons related to the mining permits and AMD discharge. Reports and a limited history of the coal mine is included in the administrative record.

During the week of December 9, 2019, the three-day sampling/monitoring event occurred. Air samples were collected using SUMMA canisters over a 24-hour sample period and analyzed for VOCs and tentatively identified compounds (TICs), total gaseous non-methane organics (TGNMO), C1-C6+ and fixed gases, CO₂ and O₂ within homes. Along with the sampling, ERT set up an AreaRAE system collocated with the summa canisters to continuously monitor indoor air quality. Temperature and barometric pressure data were collected with a centrally located weather station to determine if weather patterns would influence CO₂ concentrations in the home.

Data collected through continuous monitoring confirmed CO₂ levels above the OSHA worker standard of 5000 ppm at all three homes. No other contaminants of concern were detected in the homes. EPA through coordination with ATSDR/CDC transmitted the information to the Pennsylvania Department of Health (PA DOH).

Through 2020, EPA Senior management communicated with PA DEP Central Office several times following the receipt of the validated data in order to ascertain their ability to assist the residents. PA DEP was aware of issues with one resident related to the CO₂ for some time but was unable to assist.

In October 2020, the PA DOH issued a letter health consult (LHC) entitled 'Public Health Evaluation of Carbon Dioxide Air Monitoring Data in Multiple Residences'. The LHC identified that levels of CO₂ about 2500 ppm may cause adverse cognitive for residents and levels above 5000 ppm may cause 'metabolic acidosis'. PA DOH confirmed the CO₂ levels in the homes may result in adverse health impacts and will need to be addressed.

III. Threat to Public Health, Welfare, or the Environment

For EPA to determine that a removal action is warranted, there must be an actual or a potential unacceptable risk to human health or the environment from the release or potential release of hazardous substances, pollutants or contaminants. EPA will formally document this determination in the Action Memorandum for the NTCRA (which will be issued after the EE/CA is completed and presented for public comment).

Sampling and monitoring of the homes located within the footprint of the former mine have determined that high levels of CO₂ have accumulated in these homes above the levels recommended by PA DOH in the LHC as well as above the OSHA 8hr/day worker level.

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a Removal Action. Paragraphs (b)(2)(i), (v), and (vii) of Section 300.415 directly apply as follows to the conditions as they exist at the Site.

300.415 (b) (2) (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants

During the December 2019 Removal Assessment, levels of CO₂ above 2500 ppm were detected in three of four homes during at least one 24-hr time period as recorded by the SUMMA canister sample. The highest levels of CO₂ in samples collected ranged from 3230 ppm to 4840 ppm.

Levels of CO₂ above 5000 ppm were detected in 3 of 4 homes at some point during continuous monitoring. In one home, levels of over 7000 ppm were recorded. Additionally, during a recent loss of power in the initial home, the in-house continuous CO₂ meter detected levels of at least 10,000 ppm or 1% CO₂ in the basement of the home, the highest detection limit of the in-home CO₂ detector. Levels of CO₂ above 5000 ppm may cause metabolic acidosis, a condition in which too much acid accumulates in the body. Symptoms of metabolic acidosis include nausea, vomiting, fast breathing, and lethargy.

300.415 (b) (2) (v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released

During ERT's three-day continuous monitoring at the Site and, as noted in the OSM Technical Report, weather and barometric temperatures were shown to affect the accumulation of CO₂ into the basement of the homes. Lower barometric temperature apparently increases the accumulation of CO₂ in the homes.

300.415 (b) (2) (vii) The availability of other appropriate Federal or State response mechanisms to respond to the release

EPA Senior management has held meetings and has exchanged letter correspondence several times with PA DEP Central Office on this issue. PA DEP has indicated that they do not have the funding nor mechanism in place for assisting the residents. Additionally, the Office of Surface Mining & Reclamation Enforcement (OSMRE) informed the OSC that, due to the timing of mining activities at the Site, OSMRE had no federally funded response funds.

IV. Statutory Basis for Action

Actual or threatened release of pollutants and contaminants from this Site, if not addressed, will continue to be an imminent and substantial endangerment to the public health, or welfare, or the environment.

V. Determining the Appropriateness of the NTCRA Process

In accordance with § 300.415(b) (4) of the NCP, EPA has determined that a planning period of at least six months exists before on-site activities can be initiated. To date, Removal Assessment activities took place between October and December 2019, which identified intrusion of CO₂ into the homes from the former strip mine. PA DOH issued the LHC in October 2020.

The NTCRA is anticipated to be consistent with any further cleanup action for the Site. Failure to address the Site would result in potential risk to human health and to the sensitive population that reside in and visit these homes. Based on the above considerations, it is appropriate to conduct an EE/CA for a NTCRA.

Based on a review of applicable EPA guidance, the National Contingency Plan (NCP), and conditions at the Site, and upon approval of this EE/CA Approval Memorandum, EPA will analyze potential response options for the homes. EPA will then select a preferred response action to implement and consider the ARARs provided by PA DEP during consultation.

VI. Enforcement/Proposed Actions/Cost Estimates

With approval of this memorandum, an EE/CA will be developed and finalized, and the information generated will be used to establish the scope of the proposed actions and cost estimates. EPA cannot estimate the cost of the potential NTCRA options until the scope of work is determined by the EE/CA. If EPA finds, during the development of the EE/CA, that the cost of the NTCRA could exceed six million dollars, consultation will occur immediately with OSRE and OGC. The Action Memorandum will then be reviewed for approval via OLEM.

VII. Public Involvement

EPA expects to issue an EE/CA for public comment in mid-2021, along with a concurrent fact sheet and newspaper publication that notifies the public of EPA's preferred remedy and provides an opportunity for public involvement.

VIII. Approval/Disapproval

The conditions at the Site meet the NCP criteria for a removal action. Therefore, we are requesting approval to proceed with an EE/CA as indicated below.

Approve: _____ Date: _____
Acting Director, Superfund and Emergency Management Division