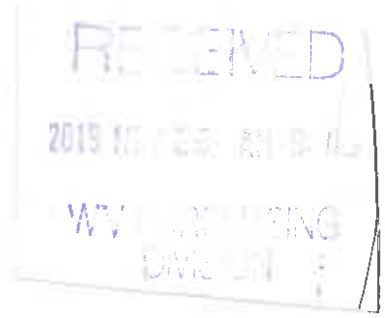
TETRA TECH

November 25, 2019
Brittany Ingraham
Department of Administration, Purchasing Division
2019 Washington Street East
Charleston, WV 25305



Re: EOI Camden Wilson Landslide CEOI DEP2000000002

Dear Ms. Ingraham,

Please find enclosed Tetra Tech's Expression of Interest for the Camden Wilson Landslide CEOI DEP 2000000002.

If you should have any questions or concerns please contact myself at katie.pugh@tetratech.com or via phone at (740)827-4965

Sincerely,

Katie Pugh

Environmental Scientist

Tetra Tech

Enclosures

Tetra Tech
302 Adams Street, Fairmont, WV 26554
www.tetratech.com

Sealed Bid EOI Camden Wilson Landslide
Buyer: Brittany Ingraham
Solicitation No, CEOI DEP2000000002
Bid Opening Date: November 26, 2019
Bid Opening Time: 1:30 PM EST
Fax Number: 304-558-3970

PRESENTED BY

Tetra Tech, Inc
302 Adams Street
Fairmont, WV 26554

tetratech.com

CORPORATE SUMMARY

Tetra Tech is a leading global provider of environmental, consulting, engineering, and technical services specializing in abandoned mine sites. Throughout its history, Tetra Tech has completed thousands of mining projects, both active and abandoned worth hundreds of millions of dollars.

Our Firm includes more than 20,000 employees in over 450 offices worldwide. Each year, Tetra Tech achieves some of the highest rankings in our industry from the prestigious Engineering News-Record. In 2019, Tetra Tech was ranked #1 overall firm in several categories including Water, Environmental Science and Water Treatment.

Our project team has an average of more than 25 years of mining and related experience. Additionally, our lead staff have an average of more than 32 years of experience. Tetra Tech has local offices and has worked on numerous abandoned mine land projects within the state of West Virginia as well as surrounding states.

RELEVANT EXPERIENCE

TETRA TECH

Royal Coal Project
Mine Drainage and Reclamation Design

CLIENT

West Virginia DEP

Office of Special Reclamation

LOCATION

Fayette County, WV

DURATION

2015 - 2017

COST

$249,100

PROJECT TEAM

Terry Smith, PE - Project Manager
Chris Lewis, PE – Sr Project Engineer
Farley Wood, PE – Project Manager
Joseph Herbstritt
Keith Lutz

REFERENCE

Nathan Parks, Regional Engineer
WV DEP - OSR
304-574-4465
Nathan.l.parks@wv.gov

KEY FEATURES

- Mine drainage treatment design
- Demolition and reclamation design
- Exploratory drilling
- Site with hillside instability history

PROJECT DESCRIPTION

Under a contract with West Virginia DEP Office of Special Reclamation, Tetra Tech performed a field evaluation and prepared design drawings and specifications for collection and treatment of abandoned mine drainage at the Royal Coal Company site located near Thurmond, West Virginia. The project area consists of two sites; the lower site which sits along the New River, and adjacent to the New River Gorge National Park and was the location of the coal preparations plant, rail loadout, coarse refuse disposal, and coal slurry disposal ponds. The upper site consists of coarse refuse disposal site. The two sites are connected by belt conveyor within a tunnel that transferred the coarse refuse from the coal preparation plant to a coarse refuse disposal site at the top of the mountain. Drainage from the lower site that is impacted by filtration through the coarse and fine refuse will be collected and treated to achieve compliance with NPDES Permit effluent limitations.

As part of the preliminary evaluation, Tetra Tech performed the following tasks: water quality characterization and flow data analysis, aerial mapping and field surveying, subsurface investigation, and a slope stability analysis. Topographic relief of the site ranges greatly, from a maximum elevation of approximately 2,330 feet to around 1,000 feet along a railroad corridor in the lower area. The site includes areas of past hillside instability dating back to 1972 when the coal preparation plant was constructed. A slope stability analysis was performed to determine areas within the permit boundary that are suitable for excavation of ponds and construction of foundations and to identify

any borrow material suitable for establishing vegetative cover over exposed coal refuse. A total of four (4) soil borings and twenty (20) test pits were completed as part of the subsurface investigation. Tetra Tech planned, supervised, and documented the subsurface exploration at the site and prepared a geotechnical report, which summarized the findings and recommendations of the slope stability analysis.

Base topography maps showing existing conditions were developed from the aerial mapping and field surveys. Tetra Tech developed grading plans, erosion and sedimentation control plans, demolition plans for remaining structures and site plans of the proposed collection and treatment system. Tetra Tech designed a gravity collection systems to route mine impacted waters to the proposed AMD treatment system and to segregate uncontaminated stormwater runoff. The AMD treatment system consists of neutralization and precipitation of metals using hydrated lime with settling ponds and a sludge disposal pond.

TETRA TECH

Frush Enterprises

Mine Reclamation and Mine Drainage Treatment

CLIENT

West Virginia Department of Environmental Protection

LOCATION

Harrison County, West Virginia

DURATION

2015 - Ongoing

COST

$125,000

PROJECT TEAM

Tom Gray, PE – Sr. Project Manager

Greg Hynes, PE – Project Manager

Terry Smith, PE – Project Engineer

Keith Lutz – CAD designer

REFERENCES

David McCoy
Senior Engineer
Office of Special Reclamation
(304) 457-4588 ext 43218
David.b.mccoy@wv.gov

KEY FEATURES

- Mine Reclamation of Bond Forfeiture Site
- Mine Drainage Conveyance and Treatment
- Slope Stability Analysis

PROJECT DESCRIPTION

Tetra Tech was awarded a design engineering contract for reclamation of the former Frush Enterprises mine site, a bond forfeiture surface mine located in Harrison County, West Virginia. The project area consists of two surface mined areas. Site A is a former surface mine site of approximately 34 permitted acres on the northern end of the project area. Underground mining occurred at Site A prior to surface mining. Site B is a former surface mine of approximately 42 permitted acres located at the southern end of the project area. The project objective is to collect acid mine drainage (AMD) from surface mined areas and from abandoned underground mine workings and then treat the AMD to meet water quality standards prior to discharge into receiving streams. A combination of passive and active treatment systems are included in the design in order to meet the effluent quality limitations. Aeration of the mine water using oxic limestone channels followed by a sedimentation pond and then a polishing constructed wetland was employed at two locations. For the largest underground mine discharge, water is treated by a mechanical aeration system followed by a sedimentation pond. In addition to collection and treatment of AMD, stabilization of two slope failures is needed. A slope stability analysis was performed to assess the cause of each of the slope failures and slope stabilization measures were designed for the areas where failures occurred.

TETRA TECH

LaRosa Fuels Inc.
Mine Drainage Study and Treatment Design

CLIENT

West Virginia Land Stewardship Corporation

LOCATION

Jordan, West Virginia

DURATION

October 2016 - Present

COST

$136,000

PROJECT TEAM

Tom Gray, PE – Sr. Project Manager

Greg Hynes, PE – Project Manager

Terry Smith, PE – Senior Engineer

REFERENCE

Ken Ellison, Manager
WVLSC
Morgantown, WV
Email: kellison@wvlsc.org

KEY FEATURES

- Site Characterization
- AMD Sampling and Flow Measurement
- Design of AMD Collection System
- Design of Active Treatment System

PROJECT DESCRIPTION

Tetra Tech was recently awarded a design engineering contract by the West Virginia Land Stewardship Corporation (WVLSC) for study and design of a mine water collection and treatment system for the LaRosa Fuels mine site, a reclaimed strip mine site. The project is the initial pilot project for the newly formed WVLSC, which was created to assist the Office of Special Reclamation of the West Virginia Department of Environmental Protection (WVDEP) in meeting its reclamation obligations and maximizing redevelopment potential for reclaimed lands. The LaRosa site is a 'bond forfeiture' site located near Jordan, WV along the boundary of Marion and Monongalia Counties. Acid mine drainage from the site flows untreated into the nearby Monongahela River in violation of NPDES permit requirements, resulting in the revocation of the site permit and forfeiture of its bond. The LaRosa Fuels mine was a surface mine of the Sewickley coal, however encroachments onto adjacent Sewickley and Pittsburgh coal deep mines also occurred. The proposed AMD treatment system was therefore required to address discharges associated with both seams.

The objective of this project is to design a treatment system to provide effluent meeting the existing NPDES water quality discharge standards for the site. Site investigations were performed included field reconnaissance, surveying, water sampling and laboratory testing, and flow measurement. From these investigations a basis for the design report and preliminary designs were prepared for a collection and active treatment system. When constructed, the treatment system is to be operated by the WVDEP. Due to the high levels of aluminum,

manganese, and iron present in the AMD, an active treatment system with lime application, flow equalization, settling ponds, and sludge settling was anticipated.

Site reconnaissance documented numerous seeps and mine water discharges, from which a sampling and flow monitoring plan was developed. Flows were field measured at each identified seep or discharge and samples collected. A field flow velocity sensor and recorder was installed in the discharge channel of the largest mine water contributor at the site, which was an abandoned open mine portal. The water sampling test results and flow measurements were combined with statistical analysis to determine proper values for use as a basis of design.

The preliminary collection system designed by Tetra Tech includes seep collectors, underdrains, conveyance pipes, and open limestone channels to convey AMD by gravity from the various sources to the anticipated treatment system location. Diversion ditches and grading is also required to eliminate impounded water and reduce the amount of surface water runoff entering the treatment system. During review of the preliminary design with the WVLSC and WVDEP, the design team concluded the initially anticipated lime treatment system was appropriate for the water chemistry but a slightly more rigorous treatment system would be more compatible with the flow observed and most importantly, would benefit from the sites proximity to other WVDEP treatment facilities. The final active treatment design therefore includes a concrete flocculation basin and clarifier, effluent monitoring and automated chemical feed adjustment, sludge removal and pumping, and primary treatment using lime slurry that is readily available, in addition to ponds for flow equalization, settling, and possible polishing.

Tetra Tech is currently working on the final design, with project documents including construction plans, technical specifications, final report, bid schedules, and construction costs due in the spring of 2017.

TETRA TECH

Wingfield Pines Inflow Reconstruction Project

KEY FEATURES

- Design Build Project
- Repair of subsidence induced failure of AMD system
- In conjunction with PA DEP Bureau of Abandoned Mine Reclamation and Allegheny Land Trust (owner)

PROJECT DESCRIPTION

Tetra Tech provided project management and engineering services to prepare design plans, drawings, specification, and construct a bulkhead to stop the uncontrolled water discharge that developed at the Wingfield Pines Conservation area. This water had previously been the inflow of a passive treatment system prior to discharge to Chartiers Creek. This project will establish a new discharge point for the mine water and re-establish the inflow water to the passive treatment system.

ENGINEERING SERVICES

Project Planning and Management

Tetra Tech performed site reconnaissance to verify existing conditions, provided a plan to seal the existing discharge, and provided project and construction management services to contractors utilized to perform the work.

Mine Pool Monitoring and Modeling

Tetra Tech provided monitoring of the mine pool elevations from the monitoring well in Boyce Mayview Park, along with monitoring of the mine outflow at the current outflow. This information will be utilized to model the mine discharge

CLIENT

Allegheny Land Trust

LOCATION

Upper St. Clair Township, Allegheny County, Pennsylvania

DURATION

1.5 Years

COST

$700,000

PROJECT TEAM

Farley Wood – Project Manager

Tom Gray – Program Manager

Katie Pugh- Project Scientist

REFERENCES

Emilie Rzotkiewicz

Vice President of Land Resources

Allegheny Land Trust

erotkiewcz@alleghenylandtrust.org

and determine the configuration of the normal and overflow discharge structures to be installed.

Engineering Design and Permitting

Tetra Tech provided site development plans for the project, and preparation of the necessary permit applications to perform the required repair work. Howard Concrete Pumping Company Inc. (Howard) was chosen as the contactor for the bulkhead installation. The drilling of rock cores will be conducted at the site of the proposed bulkhead construction to insure suitable conditions for construction. The ground conditions were evaluated to determine final design.

Lowering of Mine Pool

Tetra Tech designed and managed installation of boreholes and pumps into the existing underground mine to lower the elevation of the mine pool to the point that water was no longer discharging to Chartiers Creek at the northeast corner of the property.

Mine Bulkhead Installation

Tetra Tech designed and managed the installation of the bulkhead that prevented the flow of water to the current blowout location. The bulkhead was constructed in the two underground mine entries reporting to the surface at the northeast corner of the property. The concrete for the bulkhead was injected from surface into the mine entries; the concrete was allowed to cure; then pressure grouted to insure a secure seal with the roof, and ribs.

TETRA TECH

Blacklick Creek
Mine Drainage Treatment and Reclamation

KEY FEATURES

- Reclamation of abandoned mine sites
- Abatement of legacy mine drainage from multiple sources
- Closure of mine openings
- Subsidence potential
- Collection and analysis of mining, geologic and hydrologic data
- Mine drainage conveyance design
- Mine pool characterization and management
- Sludge disposal feasibility

CLIENT

Pennsylvania Department of Environmental Protection

LOCATION

Indiana and Cambria Counties, Pennsylvania

DURATION

October 2014 to Present

COST

$523,687

PROJECT TEAM

Thomas Gray, PE – Sr. Project Manager
Heather Trexler, PG – Project Manager
Terry Smith, PE
John Casey, PE
Eric Perry, PhD
Joseph Herbstritt
Keith Lutz

REFERENCES

Scott Poborsky, Geologic Specialist
PADEP-BAMR
814-472-1807
scpoborsky@pa.gov

PROJECT DESCRIPTION

Tetra Tech was awarded a design engineering contract for preliminary studies and reclamation of three of the largest discharges and greatest sources of acid mine drainage loading in the Blacklick Creek watershed, in Indiana and Cambria Counties, Pennsylvania. The scope of work included mine pool characterization and management, and collection and conveyance measures to reclaim and abate pollution from multiple abandoned underground mines. The work supports the Commonwealth of Pennsylvania's goals of abating legacy mine drainage and improving watershed use and function.

Mine Pool Evaluation

Tetra Tech established weirs and transducers for continual recording of mine-pool outflow from three mines; Wehrum, Vinton No.6 and Commercial No.16, that currently contribute pollution to Blacklick Creek. The discharge monitoring has collected one and half years of data, and is ongoing. Due to site conditions, flows from Vinton No.6 were estimated based on an analysis of similar adjacent mines and hydrogeologic settings. Design flow rates were established, accounting for seasonal variation, and extraction and conveyance systems from the three mines were designed based on the monitoring data. Tetra Tech also developed a mine pool management plan with

recommended mine pool operating water levels and treatment flow rates. The plan is based on the estimated mine-pool storage capacity and recharge rate. Storage volumes were derived from a detailed analysis of mine maps and hydrogeologic data.

Two other mines, Diamond Mines No.2 and No.3, were initially considered as a location for underground disposal of treatment sludge. A mine pool exists within these mines but no significant discharge had been located and PADEP was concerned about the addition of sludge to the mine pool. Tetra Tech conducted site evaluations including field searches for indicators of mine discharges, and also performed a pollution loading study for the Conemaugh River. The Conemaugh River flows adjacent to the southern and down-dip boundary of the Diamond Mine complex and was considered a potential discharge area for the Diamond mines. Tetra Tech established transects for flow and water quality data collection. The evaluation found no significant mine water discharges from the Diamond Mines.

Sludge Disposal Feasibility
This project also included assessing the underground sludge disposal capacity for three mines. Tetra Tech selected potential sludge injection locations within the Wehrum, Vinton No.1 and Diamond Mines based on estimated storage capacity derived from mine geometry, surface features, pipeline path from the mine water treatment plant and calculated operating life of the preferred injection location.

Subsidence Review
Tetra Tech evaluated underground mine subsidence hazard for two potential treatment plant locations. Detailed mine maps of the Wehrum Mine were reviewed to categorize the potential for subsidence based on review of mine workings, overburden thickness and stratigraphy. Tetra Tech prepared recommendations for siting and construction of treatment plant facilities over the mine workings.

Reclamation, Closure of Mine Openings
Tetra Tech designed abandonment plans for existing discharges from a shaft and boreholes from the Wehrum and Vinton No.6 mines. The shaft and boreholes are currently open to the mine works and discharge mine water under artesian conditions. Tetra Tech designed a grouting plan to close the mine openings. Three artesian boreholes are within the Blacklick Creek stream channel. The reclamation plan included specifications for a cofferdam to work in dry conditions and minimize effects on the stream during borehole sealing.

Tetra Tech prepared a regrading and revegetation plan for an abandoned coal refuse pile with the assumption that most of the coal refuse material will be taken off site.

Permitting
Federal, state and local permits and clearance with PA Historical and Museum Commission are in preparation for the planned extraction, conveyance and reclamation sites.

TETRA TECH

Scenic Railroad Mine Subsidence Evaluation

FEATURES

- Subsidence Investigation
- Exploratory Drilling
- Categorized Areas by Subsidence Risk
- Developed Conceptual Mitigation Plan

PROJECT DESCRIPTION

The first two miles of the Western Maryland Scenic Railroad from Frostburg to Cumberland is undermined by one coal seam and partially by two coal seams. Mining is shallow and signs of subsidence have been seen by Maryland Department of the Environment (MDE) staff. Tetra Tech investigated the probabilities of subsidence and prepared a preliminary remediation plan and cost estimate.

CLIENT

Maryland Department of the Environment – Bureau of Mines

LOCATION

Frostburg, MD

DURATION

3 Months

COST

$120,000

PROJECT TEAM

Thomas Gray, P.E. – Sr Project Manager
Farley Wood, P.E. – Project Manager
Jim Goroncy, P.E. – Project Engineer
Katie Pugh – Environmental Scientist

REFERENCE

Mr. Mike Garner
MDE, Bureau of Mines
301-689-1460
mgarner@allconet.org

Tetra Tech reviewed in detail the mine maps and categorized mining zones into one of the three general categories, as follows:

- Category 1 - Subsidence probably occurred during or soon after mining.
- Category 2 - Support area where subsidence is unlikely.
- Category 3 - Area where subsidence may occur in the future if it has not already occurred.

Since mining and the available mine maps were old, exploratory drilling was used to increase our site knowledge and to improve our confidence in predicting the future subsidence potential.

A field reconnaissance of the study area was performed by Tetra Tech field staff experienced in identifying subsidence features. The reconnaissance was performed along the railroad and on both sides for a minimum of 50 feet. Potential subsidence features such as cracks, depressions, or landslides were field-located using GPS technology, marked with flagging, and photographed.

An elevation profile was generated for the portion of the railroad under investigation. The profile was used to identify evidence of subsidence based on unusual or subtle changes in railroad grade elevation. An area of subsidence may be evidenced by a drop in elevation that is not consistent with the local topography, especially if it correlates with the location of mine workings under the railroad bed.

Based on the results of the mine map review, the field reconnaissance and the profile survey, test borings were located and drilled near the railroad tracks to determine subsurface conditions down to the base of the Big Vein Coal Seam. A borehole camera was lowered into each boring to provide a more detailed assessment of subsurface conditions (such as void locations and thickness) where mining had occurred.

Tetra Tech utilized the information obtained in the investigation and provided the MDE with a written report of findings and recommendations. Tetra Tech categorized all of the railroad's line that lies over mined area as low, medium, or high risk subsidence potential. Remedial options were discussed and a recommendation of a mitigation technique was provided.

TETRA TECH

Dolph Mine Fire Project

KEY FEATURES

- Exploratory Drilling for Refuse/Mine Fire Investigation
- Mitigation Planning
- Conceptual Extinguishment Plan

PROJECT DESCRIPTION

An abandoned refuse/mine fire is located in Olyphant Borough, Lackawanna County, Pennsylvania, less than a mile south of Exit 2 of US Route 6 East (known locally as Casey Highway) and about 3 miles northeast of Scranton and Dunmore.

There are two coal seams that were both underground and surface mined. The higher No. 2 Dunmore Seam was surface mined for most of the area of the fire but was not reported to be on fire in 2006. This seam outcrops several hundred feet to the southeast of the fire area. The No. 3 Dunmore lies about 30 to 40 feet below the No. 2 Dunmore. A small area of the No. 3 Dunmore north of the mine fire was surface mined. Both seam dips in a northwest direction from the fire area. The fire was found in 2006 to be spreading in this seam.

CLIENT

PADEP Bureau of Abandoned Mine Reclamation

LOCATION

Scranton, PA

DURATION

2016-2017

COST

$150,000

PROJECT TEAM

Thomas Gray, P.E. – Sr. Project Manager
Tim Connolly, P.E – Project Manager
Gary Zurawski, EIT
Mike Korb, P.E. – Project Engineer

REFERENCE

Thomas Raskiewicz – Project Designer
PADEP BAMR
570-830-3190
traskiewic@pa.gov

To contain the fire a cutoff trench down to the base of the No. 3 Dunmore was designed to act as a barrier along the south, west, and north perimeters of the active fire zone at that time. An approximately 15 acre site would remain where the fire could actively burn. The cutoff trenches were constructed in 2007.

Tetra Tech evaluated previous studies at the Dolph mine fire and is supplementing the data with additional drilling by our sub-consultant AWK to better characterize and differentiate the previously burned areas. Tetra Tech is currently developing a conceptual plan for the Dolph mine fire remediation based on information obtained from mine fire monitoring equipment. Preliminary designs will be included that show work areas at the site and how any excavated materials will be handled. A construction sequence and schedule will be prepared along with the plan and cost estimate.

TETRA TECH

Rausch Creek Treatment Plant
Design for Upgrades

CLIENT

Pennsylvania DEP - BAMR

LOCATION

Schuylkill Co., Pennsylvania

DURATION

2016 - 2017

COST

$129,400

PROJECT TEAM

Farley Wood, PE – Project Manager

John Casey, PE – Project Engineer

REFERENCES

Thomas Matinas
570-830-3172
tmatinas@pa.gov

KEY FEATURES

- Evaluation of existing AMD treatment plant
- Water supply system redesign
- Backup generator upgrade design
- Polymer system upgrade design
- Construction specifications, contract documents, and cost estimate

PROJECT DESCRIPTION

Tetra Tech was selected to provide design engineering services for the upgrade of the Rausch Creek AMD Treatment Plan located just south of Valley View, Pennsylvania. The plant was built in 1972 to treat the entire flow of Rausch Creek which had been severely impacted with acid mine drainage from earlier mining in the watershed. The creek is intercepted and the flow is diverted to the treatment plant. The plant support systems and components date from the time of original construction. Tetra Tech was selected to develop plans for upgrading the water supply, emergency generator and polymer batching system. This entailed generating design bases for each to take into account changes and developments since 1972.

The plant water supply system as originally installed included a 100,000 gallon capacity steel elevated tower, 125-ft tall, which is fed by a well. Over the years, the tower integrity deteriorated to the point that the water supply system needed to be replaced. As part of the project, Tetra Tech performed a needs assessment to determine what the current and expected future water demands would be, e.g., chemical make-up, washdown etc. This formed the design basis for the water suppiy system. Considerations were given to rehabilitation and replacement, however, the existing structure was beyond repair. As a result, Tetra Tech developed a plan to install a new variable frequency drive pump coupled with a bladder tank to allow the plant to meet its maximum and average water demands without having to maintain a large elevated storage tank.

The plant was built with a diesel driven emergency generator to provide power when the local power supply would fail. The existing generator was supplied with the plant installation. Over time it became costly to operate and find parts. It was also a major consumer of plant water. Tetra Tech performed a needs assessment to determine emergency power needs. The design basis was developed from the needs assessment. Tetra Tech investigated several emergency generators and with the BCR selected the type of generator needed by the plant.

The existing polymer batching system is a manual system that requires operator attention to make-up batches of polymer. This is time consuming and labor intensive as the batching may occur more than once per day. In order to free up the operators for other duties, Tetra Tech developed an automatic polymer batching system that will allow the plant personnel to fill the unit with dry polymer once or twice a week. The batching system will then automatically make-up batches of polymer over the course of the week. In order to implement the upgrades, Tetra Tech developed preliminary plans for each upgrade and presented these plans along with a cost estimate of the work. After review and approval of the preliminary plans, Tetra Tech prepared construction drawings, specifications, contract documents, and an engineer's cost estimate.

The upgraded systems will allow the plant to run more efficiently and safely.

PROJECT TEAM

TETRA TECH

THOMAS GRAY, P.E.

Program Manager

EXPERIENCE SUMMARY

Mr. Gray has more than 40 years of professional experience. He is a technical expert in mining engineering, mine reclamation, coal ash disposal and utilization, watershed and ecosystem restoration, mine subsidence, acid mine drainage remediation, mine stabilization via grouting and abandoned mine fire mitigation. Mr. Gray specializes in active and abandoned mining projects and with infrastructure projects that have mining related concerns. His project management responsibility has included construction, engineering, regulatory compliance, and research and development. He has been responsible for the successful completion of many unique projects.

EDUCATION

BS, Mining Engineering, Pennsylvania State University, 1973

MBA, University of Pittsburgh, 1977

AREA OF EXPERTISE

Program Management

AML Project Management

REGISTRATIONS

Professional Engineer, WV, 1988, [redacted]

Professional Engineer, PA, 1978, [redacted]

Professional Engineer, MD, 1989, [redacted]

Professional Engineer, VA, 1980, [redacted]

Professional Engineer, OH, 2009, [redacted]

OFFICE

Pittsburgh, PA

YEARS OF EXPERIENCE

44

YEARS WITH TETRA TECH

10

RELEVANT EXPERIENCE

Open-End Mining Contracts

Project/Contract Manager; 2011-2017; Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Currently managing this open-end contract to provide professional design services to remediate problems such as acid mine drainage, contamination of water supplies, degraded stream quality, subsidence, and abandoned refuse and waste piles, strip mines, highwalls, and landslide-prone areas.

Project/Contract Manager; 2002-2007; Professional Design Services Contract; U.S., Office of Surface Mining; Pittsburgh, PA. Managed this open-end contract while with a previous consultant to provide professional design services to remediate problems such as acid mine drainage, contamination of water supplies, degraded stream quality, subsidence, and abandoned refuse and waste piles, strip mines, highwalls, and landslide-prone areas.

Senior Project Manager; 2002-2006; Open-End Contract; Maryland Department of the Environment Bureau of Mines; Frostburg, MD. Managed an open-end contract to provide technical assistance in mine engineering, acid mine drainage treatment and mine reclamation. Completed 16 projects, including evaluating the use of solar or wind power to operate a mine water treatment plant.

Plans for Reclamation of Abandoned Mine Lands

Senior Project Manager; American Bituminous Powers Partner, LP; Reclaimed mine site investigation; $7,000; Marion County, WV; April 2012. Performed a site assessment and provided general recommendations as to the possible source and corrective actions for elevated levels of Aluminum of a reclaimed surface coal mine. Based

on soil and ground water samples, it was determined that the elevated aluminum was related to the naturally low pH of the topsoil that was releasing high levels of soluble aluminum, which can be toxic to some vegetation.

Senior Project Manager; Abandoned Coal Mine Pool Wastewater Overflow Elimination; Township of Upper St. Clair in conjunction with PADEP, Three Rivers Wet Weather Development Corporation, EPA, and Heinz Foundation; Upper St. Clair, PA. Investigated feasibility of eliminating wastewater overflows by diverting the flow into a pumped down abandoned underground coal mine pool as a temporary storage reservoir. After weather event subsides the overflow would be pumped out of the mine to a treatment facility. The project addressed not only the pollution from the sewer overflow but also the pollution from the mine drainage as both would be treated together. The DOE's National Energy Technology Laboratory and the University of Pittsburgh assisted with the project by researching the combined treatment of alkaline sewage and acidic mine water.

Project Manager; Coal Combustion Byproduct Based Grout Project; WVDEP; Monongalia County, WV. This R&D project injected coal combustion byproduct based grout into 25 acres of abandoned mine workings to reduce the generation of AMD and to reduce subsidence potential. Responsible for research and development investigation, construction plans and specifications, monitoring construction, and preparing a research report. Project sponsors included Allegheny Energy, DOE, Consol, and the Electric Power Research Institute.

Project Manager; OSM Little River Mining Reclamation Project; Cloudland, GA. The Office of Surface Mining Little River Reclamation project near Cloudland, Georgia, required regrading an abandoned coal mine strip pit to eliminate a highwall, construction of drainage channels, and revegetation of disturbed areas. The survey was conducted to prepare site topography and cross sections at 50-foot intervals for reclamation and restoration of approximately 2,500 feet of abandoned highwall (as high as 100 feet) from surface mining. A grading plan was prepared that included site drainage features for two drainage channels.

Closure of Mine Openings

Senior Project Consultant; Mine Seal Research; NIOSH; Fayette County, PA. Research project to evaluate a potentially significant improvement to current state-of-the-art practice of constructing mine seals through vertical boreholes when direct access is prohibited. The new technology was tested and proved to be effective in providing barriers to airflow and to impound water and other inert materials.

Project Manager; Fisher Run and Tunnelton Mine Portal Closures; WVDEP Office of AML and Reclamation; Lewis and Preston Counties, WV. Project Manager for the preparation of construction drawings to install wet mine seals and drainage improvements for the closure of abandoned mine portals on private property in Weston and Tunnelton, WV. Prepared construction specifications and construction cost estimate for the closure of nine mine portals.

Project Manager; Mine Seal Designs; Ohio Valley Coal Company; Aledonia, OH. Prepared mine seal designs for three shafts for use at an active coal mine during mine closure. The mine seals were designed to withstand the expected water pressure after the maximum mine pool has developed.

Control and Extinguishment of Subsurface Mine Fires

Senior Program Manager; Dolph Mine Fire Characterization and Conceptual Design; Lackawanna County, PA. Developing a Conceptual Plan for the mine fire remediation based on mine fire monitoring pointes completed in the spring of 2017. The plan is being completed in enough detail so that a cost estimate (+/- 35 percent) can be

prepared. Preliminary design drawings are being included that show work areas at the site and how any excavated materials will be handled including a construction sequence and schedule estimate.

Senior Engineer; Colorado Statewide Mine Fire Abatement Contract; Colorado Division of Reclamation, Mining and Safety; CO. The Colorado Inactive Mine Reclamation Program (CIMRP) is charged with abating, to the extent possible, hazards associated with mining activities resulting from mining which occurred prior to August, 1977. Six underground coal mine fires were identified for funding for reclamation design for their abatement and Tetra Tech was retained for this work. Mr. Gray is serving as a lead engineer supporting this work, which includes project development, design, procurement documents, and field management of fire abatement activities. Projects begin with the development of a mine fire abatement strategy and then the development of an abatement design. An Invitation for Bid is then created to find a suitable contractor and Tetra Tech then provides construction management and inspection services.

Project Manager; Abandoned Coal Mine Fire Remediation Plan; Confidential Client; PA. During the development of a well pad, a natural gas drilling client operating in the Marcellus Shale experienced elevated temperatures in excavated materials due to a burning abandoned coal mine. Tetra Tech investigated the subsurface conditions and Mr. Gray managed a Mine Fire Remediation Plan for the client.

Senior Project Manager; Dolph Mine Fire; Office of Surface Mining; Lackawanna County, PA. The Dolph mine fire was burning in coal refuse and two underground abandoned anthracite coal mines. A site investigation was completed to define the limits of fire and to recommend fire control methods. A cut-off trench was selected, plans and specifications were prepared and a contractor was selected. Construction was successfully completed and the fire is under control. Mr. Gray is currently (2017) assessing the extent and degree of the fire area and will develop a conceptual extinguishment plan.

Project Advisor; World Bank Mine Fire Appraisal; Dhanbad, State of Bihar, India. Assisted in the mine fire appraisal project to assess the fires in 17 coal seams of the 450 sq. km. coalfield for the world's largest complex of above-ground and underground mine fires.

Abatement or Treatment of Drainage and Acid Mine Drainage Water Pollution

Project Manager; Parker Run Mine Drainage Design; West Virginia Department of Environmental Protection Office of AML&R; Marion County, WV. Provided design services for drainage conveyances, mine seals, highwall reclamation, refuse reclamation, stream bank stabilization, structural and trash removal/disposal, and re-vegetation of disturbed areas.

Senior Program Manager; Blacklick Creek Vinton/Wehrum Mine Drainage Treatment Facility Design; PADEP Bureau of Abandoned Mine Reclamation; Indiana County, PA. Tetra Tech was retained by PADEP for the initial planning of a mine drainage treatment facility. Managing this large, multifaceted project included the design of a mine water conveyance system, design of relief boreholes, assessment of local mines for sludge disposal, coal refuse pile analysis, mine shaft and subsidence assessment, historical and museum commission documentation/clearance, and conceptual treatment facility layout.

Senior Program Manager; Palo Alto Mine Drainage Study and Design; PADEP Bureau of Abandoned Mine Reclamation; Borough of Palo Alto, PA. Managing this mine drainage study. Mine drainage is appearing at a residence in the Borough of Palo Alto during heavy precipitation events. Previous attempts at remediation by PADEP

and the Office of Surface Mining were unsuccessful. Tetra Tech will conduct study the site then provide preliminary and final designs. The project will also include drilling, water testing, and surveying.

Project Advisor; East Avoca Mine Drainage Study; PADEP Bureau of Abandoned Mine Reclamation; Avoca Borough, PA. Providing oversight for this mine drainage study in Avoca, PA. Several residents along Grove Street in Avoca have reported incidents of mine water in basements and in their yards during heavy precipitation events. Tetra Tech's investigation determined the location and depth of abandoned mine workings that may be the source of mine water occasionally noted along Grove Street. Tetra Tech will then propose alternative solutions to abate the drainage problem.

Project Manager; Feasibility Study for Use of Mine Water in Unconventional Oil and Gas Operations: Pennsylvania Department of Community and Economic Development: December 2015 – August 2016; The Shale Alliance for Energy Research Pennsylvania (SAFERPA) assembled a project team, including Tetra Tech, the University of Pittsburgh, Aquatech International Corporation, and the Gas Technology Institute to evaluate the feasibility of using mine water as a source of water for hydraulic fracturing (fracing) operations. The project team evaluated methods and technologies to remove sulfate from mine water to meet the specifications for use in fracing operations. Tetra Tech identified sites where mine discharges are located in proximity to oil and gas operations throughout the Commonwealth and selected sites where treating mine water for use in oil and gas operations would be beneficial to the environment and could potentially be used for fracing.

Senior Project Manager; Alkaline Coal Ash Injection to Mitigate Acid Mine Drainage; CTC Foundation in conjunction with PADEP BAMR and Others; Washington, DC. Evaluated the injection of alkaline coal ash into the 537-acre Valley No. 2 mine to mitigate an AMD (500 gpm) pollution to the Conemaugh River and nearby Big Spring Run. Provided technical consultation for the investigation and authored a technical report. The project team included PADEP, Bureau of Abandoned Mine Reclamation, the Kiski-Conemaugh Coalition, Blacklick Creek Watershed Association, Reliant Energy, the Western PA Watershed Protection Project, St. Clair Township, and PA DCNR.

Senior Project Manager; Acid Rock Seepage Mitigation; University of Pittsburgh in Conjunction with PADOH; Snowshoe, PA. A research project was conducted to determine the cause of and the potential mitigation solutions to an acid rock seepage condition in a rock filled highway embankment. It was determined that infiltration percolating through the embankment was becoming acidic when contacting pyrite rich sandstone. The now acidic water further contacted the underlying clays and developed high concentrations of aluminum. The seepage, estimated to average 25 gpm, severely polluted Jonathan Run. Mitigation schemes were evaluated and treatment was selected. A preliminary design of a sodium hydroxide treatment system was prepared.

Senior Project Manager; South Branch Blacklick Creek Acid Mine Drainage Feasibility Study; USACE Pittsburgh District; Nanty Glo, PA. Completed a feasibility study to determine the most effective passive abatement method for treating acid mine drainage at the abandoned mine and restoring the aquatic environment of the South Branch Blacklick Creek. Project manager for the conceptual design and cost estimate. A general evaluation report for the restoration of the aquatic ecosystem was completed.

Senior Project Manager; Mine Pool Acid Discharge Investigation; LTV Corporation; Greene County, PA. Conducted an investigation of the potential to utilize biological remediation for a large mine pool acid discharge. Responsible for evaluating and developing a field test to utilize sulfate reduction bacteria to mitigate the large Clyde Mine Pool discharge.

Project Manager; Acid Mine Drainage Identification / Mine Pool Water Sourcing Study; Confidential Client; Forest City, PA. Identified large acid mine drainage sources around Forest City to be used as potential sources of water for a Marcellus Shale client's fracing operations in northeast PA. Mr. Gray gathered the historic flow and chemistry data for the discharges. Two discharges were singled out for further consideration, Vandling and Grey Slope. The mine pools were georeferenced onto a map with these discharges. A conceptual passive treatment system was designed for the Vandling Discharge with an associated pipeline to transport the water to a truck loading area.

Evaluation and/or Rehabilitation of Existing Passive or Active AMD Treatment Systems

Senior Program Manager; AMD Treatment; PADEP; Cresson, PA. Supporting this preliminary design evaluation associated with the proposed Cresson AMD Treatment Plant. BAMR has entered into an agreement with the Susquehanna River Basin Commission to provide treated AMD to supplement flow during low flow periods. Project is currently in the field investigation phase to identify the location of the proposed facility and mine water extraction wells.

Project Manager: Bear Run Acid Mine Drainage Passive Treatment System; Indiana County Conservation District in Conjunction with PADEP; Indiana County, PA. Project Manager for the design of a passive AMD mine treatment system, site grading and PADEP / Indiana County Erosion and Sediment Control permit, stream restoration and preparation of a PADEP Government Financed Construction Contract for a third party contractor to remove coal refuse from the site. Prepared construction grading plans, permits and hydraulic analysis of the Bear Run stream for a stream culvert crossing.

Project Manager: Group Gladden Mine Acid Mine Drainage Treatment System; South Fayette Conservation; South Fayette Township, PA. Preparation of a site grading plan and passive AMD treatment system to treat a maximum flow rate of 1,500 gpm of AMD flow from the abandoned Gladden Mine into Millers Run and Chartiers Creek. Preparation of a grading plan, specifications and design calculations to create 3 acres of passive treatment ponds and design of a spray pumping system to deliver 1,000 gpm of AMD through a nozzle system for aeration and evaluation of stream flow losses in areas affected by past mining.

Senior Project Manager; Jandy Coal Refuse Acid Mine Drainage Investigation and Design; Paint Creek Watershed Association in Association with PADEP; Windber, PA. Investigated acid mine drainage on the Jandy coal refuse disposal site. It was determined that the source of the contamination was a reclaimed surface mine spoil and adjacent abandoned deep coal mine. The selected mitigation approach was to reduce the surface infiltration through drainage controls and to reduce the level of the mine pool so that the groundwater levels would be reduced and thus eliminate the discharge. Design plans were prepared as part of this project.

Project Consultant; Owings Mine Complex Site Reclamation Acid Mine Drainage Treatment System Design; WVDEP; Charleston, WV. Reclamation design of an abandoned mine site comprising old mine structures, open mine portals, refuse piles and numerous acid mine drainage producing discharges. Evaluated water quality and designed a passive AMD treatment system design at the Owings Mine Complex site. ***Awarded: James E. "Pete" Pitsenbarger AML Award North, West Virginia Reclamation Awards.***

Water Line Extension/Water Line Replacement

Project Manager; Pump and Overland Pipeline System; Duquesne Light Company; Greene County, PA. Designed approximately two miles of a pump and overland pipeline system and provided designs and specifications for a half mile overland pipeline, including a bridge crossing.

Project Advisor; Gauley River and Heizer/Manilla Creek Water Line Extensions; WVDEP; Nicholas County, WV. Evaluated construction documents for the Gauley River and Heizer/Manila Creek water line extension projects.

Project Manager; Water Pipeline and Pump Station; Cambria Township Water Authority in conjunction with Inter-Power/AICon Partners; Colver, PA. Designed and provided construction inspection for a 2.5-mile water pipeline and pump station project. The system provides up to 1600 gpm of water for the Municipality of Cambria Township and for the Colver Power Plant. The Colver Plant is a 110 mw water-cooled facility.

Surface Mine Reclamation

Project Manager; Coal Ash Disposal Guidelines for Surface Mines; Maryland Department of Natural Resources; MD. Prepared guidelines for the disposal of coal ash in surface mines.

Mine Subsidence Control

Senior Program Manager; Scenic Railroad Subsidence Evaluation; Western Maryland Scenic Railroad; Frostburg, MD. The first two miles of the Western Maryland Scenic Railroad from Frostburg to Cumberland is undermined by one coal seam and partially by two coal seams. Mining is shallow and signs of subsidence have been seen by Maryland Department of the Environment (MDE) staff. Acted as Senior Program Manager for an investigation of the probabilities of subsidence and prepared a preliminary remediation plan and cost estimate. Mine maps were reviewed and mining zones were categorized into one of the three general categories. Exploratory drilling was used to increase our site knowledge and to improve our confidence in predicting the subsidence potential future.

Project Manager; Mine Subsidence Investigation; Virginia Department of Mines, Minerals, and Energy (VA DMME); Wise County, VA. Mr. Gray led an investigation to characterize suspected mine voids on two residential properties which exhibited evidence consistent with mine subsidence. Mr. Gray retained and coordinated with two subcontractors to aid in completing the work – a land surveyor and a driller. Work consisted of a property survey, a ground penetrating radar (GPR) survey, and generation of mapping and a drilling investigation plan. Mr. Gray completed the drilling investigation plan by selecting locations to drill based on physical observations and the results of the GPR survey. Drilling operations included downhole camera services by the Federal Office of Surface Mining (OSM). After the drilling was completed, a report was drafted including recommendations for addressing the subsidence features.

Project Manager; Natural Gas Pipeline Subsidence Study; MarkWest Energy; Southwest PA. MarkWest Energy approached Tetra Tech to perform a preliminary subsidence study to determine the level of subsidence risk along two proposed natural gas pipeline alignments in southwest PA. The appropriate mine maps of the mines which were located beneath the proposed alignments. The proposed alignments and mine maps were georeferenced onto a USGS map. The level of cover was identified and the existing and planned mine workings by mining method and approximate extraction ratio were classified. This information was used to predict the relative presence/risk of past, present, and future subsidence. A high risk of future subsidence under one of the alignments was identified.

Senior Project Manager; Subsidence Evaluation; Duke Energy; Edwardsport, IN. Evaluated subsidence potential at an undermined site selected as a new power plant location. The mining under this site was approximately 50 feet deep and had been abandoned for over 50 years. Plans and specifications were prepared for grouting 20 acres of the site with a fly ash/cement mixture. Testing was performed to verify the suitability of the grout mix. Available onsite ash was investigated and determined to be acceptable. Construction monitoring was also performed.

Project Manager; West Elk Mine; Mountain Coal Company, LLC; Somerset, CO. Completed subsidence evaluation and report for ten longwall panels extending into the Dry Fork lease in Gunnison County, CO. Potential impacts to Deep Creek Ditch were evaluated.

Senior Program Manager, West Virginia DEP, Office of Special Reclamation, Royal Coal Project Reclamation and Water Treatment: Manage engineering and reclamation design for bond forfeitures site in southern West Virginia. Site consists of coal preparation plant remnants, coarse refuse disposal, slurry disposal, rail siding, and water treatment system design to meet discharge standards.

Senior Program Manager, PaDEP Rausch Creek Plant Upgrades (2016) Capital Project: Managed upgrade and modernization project for watershed based acid mine drainage treatment facility located in eastern Pennsylvania.

Senior Project Manager, Cresson Acid Mine Drainage Abatement Project: PADEP; Cresson, PA. Project Manager and Engineer for an acid mine water collection and treatment system. Performing preliminary design engineering services and detailed design engineering services under a contract with the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation (BAMR) for the Cresson Acid Mine Drainage Abatement Project. The project objectives are to eliminate three mine discharges and restore approximately 21 miles of streams that are currently impacted by mine drainage and to provide treated AMD to supplement flow in the West Branch Susquehanna River during low flow periods. The proposed 6.3 MGD AMD treatment facility will be located on a major tributary of the West Branch Susquehanna River. Three underground mine pools will serve as reservoirs. Extraction wells and pipelines supply water to the proposed treatment plant as needed to manage the mine pools and maintain stream flow and improve water quality in the receiving streams.

Senior Program Manager; Glenn Springs Holdings, Inc.: Tire Hill, PA. Provide project management, engineering services and permit assistance to owner/operator of a 6 MGD AMD collection and treatment system. Currently in the design phase of a new pump and treatment system to replace existing AMD facilities.

Water Supply Replacement

Project Advisor; Water Supply Extension Project; WVDEP; Logan County, WV. Prepared construction documents for a water supply extension project.

Project Advisor; Mill Creek-Isom Water Supply System Design; WVDEP; Chapmanville, Logan County, WV. Designed a water supply system to service approximately 800 residents of the Mill Creek-Isom Community along Godby Branch watershed.

Project Manager; Geotechnical and Hydrologic Investigation to Provide Municipal Water Supply; Inter-Power/AlCon Partners; Colver, PA. Conducted a geotechnical and hydrologic investigation for a 53'-high embankment dam to provide a municipal water supply and cooling water for a cogeneration power plant. Completed an environmental assessment, including wetland delineation, wetland mitigation design and cultural resources

investigations. Provided design, cost estimating, permitting and construction monitoring services for the Dam and Reservoir.

Other Mining Related Projects

Senior Program Manager, US Dept. of Energy / National Energy Technology Laboratory, Rare Earth Elements Associated with Coal and Coal By-Products: Managed project to identify and quantify the existence high levels of rare earth elements in coal seam and associated geology in the Northern Appalachia, Central Appalachia, and Rocky Mountain coal basins.

Senior Program Manager; Northeast Power Company: McAdoo, PA. Completed a fuel supply and ash disposal evaluation for the NEPOCO CoGen Plant in McAdoo, PA. Contacted suppliers and collected information about the quality and quantity of culm reserves and the permit status of the facilities. Based on preliminary screening, site visits were made to selected sites to identify suppliers with sufficient reserves that could supply fuel to the Co-Gen plant at competitive market prices. A final report was submitted with recommendations on future fuel suppliers for this facility.

Project Manager: Fishing Run Stream Sealing; South Fayette Conservation Group (SFCG) in Association with PADEP; South Fayette Township, PA. Installation of five (5) weirs and continuous flow meters to monitor the stream flow conditions, analysis of flow data, stream corridor land surveying, geophysical surveying to identify subsurface cracks and flow patterns, stream base study to identify stream sections which flow directly over fractured bedrock, stream sealing design alternatives analysis, and the stream encroachment permit pre-application meeting.

Project Manager; Gladden Mine Pool Water Sourcing Study; Range Resources South Fayette Township, PA. Range Resources was seeking a source of water for their fracing operations near South Fayette Township. Tetra Tech analyzed the feasibility of pumping and treating water from the Gladden Mine Pool at a rate sufficient to lower the mine pool enough cut off the Gladden discharge and restore Miller's Run.

Senior Project Manager; Kempton Mine Water Treatment Facility; MD Department of the Environment Bureau of Mines; Frostburg, MD. The Kempton mine water treatment facility was designed to use electricity generated by a diesel engine due to its remote location. Alternative sources of electricity were investigated, including solar, wind and a new transmission line.

Senior Project Manager; Chartiers Creek/Fishing Run Mine Discharge Investigation; South Fayette Conservation Group in Association with PADEP; South Fayette Township, PA. During an investigation of the deep mine discharges in Chartiers Creek it was found that Fishing Run was being diverted into a deep mine entrance and after becoming polluted coming out at the Gladden discharge, the largest pollution source in the watershed. Through a grant from PADEP a reclamation design was prepared and permitted. The design included sealing the mine entrance, reclaiming abandoned highwalls, removing dangerous mine structures and restoring 2000 feet of stream channel. Construction monitoring was performed.

Senior Project Manager; Geotechnical Investigation for Monongahela Properties; Office of Surface Mining; Washington County, PA. Managed a geotechnical investigation to provide an opinion on the source of ground movements that damaged four properties in the town of Monongahela. Responsible for conducting exploratory drilling and preparing a report of findings for four residential properties and the intervening roadway that had been affected by ground disturbance.

Senior Project Manager; Water Well Investigation; Office of Surface Mining; Indiana County, PA. Evaluated water wells to address complaints of methane gas venting from old wells. Provided an opinion of the source of gas being vented from the wells.

Project Consultant; River Conservation Plan; Kiski-Conemaugh River Basin Alliance; Johnstown, PA. A river conservation plan for the 1,800 sq. mile Kiski-Conemaugh River Basin comprising five major watersheds was prepared. The River Basin Conservation Plan resulted in a comprehensive plan aimed at remediation the river basin. The plan was prepared in accordance with the guide lines of the PA DCNR Rivers Conservation Program.

Project Engineer; Underground Coal Mining Complex Evaluation and Water Treatment Plant Design; Inter-Power of New York; Colver, PA. Completed a potential environmental liabilities assessment of a large property. Provided a water treatment plant preliminary design and associated cost estimates. Evaluated potential environmental liabilities associated with the purchase of an inactive underground coal mining complex and associated runoff and leachate collection ponds, including mine, surface water, and refuse pile leachate and runoff collection and treatment, and ecological and ground-water impacts. Cost estimates for post-closure, including water treatment were also prepared.

Project Manager; Galbraith Landslide Abatement/Geotechnical Investigation; Office of Subsurface Mining; Allegany County, MD. Conducted a geotechnical investigation to gather the required site information to design landslide abatement measures for a 140-ft. wide landslide uphill from the Galbraith residence in Barton, MD. The investigation involved drilling, testing, and surveying to characterize the site, and design abatement measures to stabilize the landslide.

Project Manager; Coal Refuse Pile Slope Stabilization; Office of Surface Mining; Allegany County, MD. Prepared an abatement plan for stabilizing the slope of a coal refuse pile (Sand Spring gob pile) adjacent to a small stream. The refuse pile was eroded by the stream during Hurricane Ivan and left a near vertical, unstable slope. The abatement plan consisted of a combination of regrading and vegetative ("soft armoring") and riprap stabilization. Hydrologic and hydraulic analyses were also provided.

Senior Project Manager; Mine Shaft Investigation; Office of Surface Mining; Auburn, MI. Project Manager responsible for investigating and determining the location of 13 mine shafts, varying in depth from 100 feet to 250 feet. The shafts were subsequently stabilized using compaction grouting under a separate project.

TETRA TECH

FARLEY R. WOOD, P.E.

Senior Project Manager, Operations Manager, Principal Engineer

EXPERIENCE SUMMARY

Farley Wood has over 35 years of diverse experience in the mining industry. His experience includes engineering, operations, project management, environmental and safety compliance, permitting, mergers and acquisitions, and executive level leadership. He is a licensed Professional Engineer in Pennsylvania, West Virginia, and Ohio.

Mr. Wood's expertise encompasses surface mining techniques including truck and shovel, draglines, highwall mining, and dredging systems; along with underground mining techniques encompassing both room and pillar and longwall methods; along with refuse and tailings disposal. His engineering experience covers mine design, cost estimating, long and short-term operational planning, reserve development, exploration, maintenance planning, surface and underground mine planning operations, mine closure, mineral and aggregate processing, coal cleaning/preparation, waste and tailings disposal, stream relocation and restoration, acid mine drainage treatment systems, health and safety, and quality management.

Mr. Wood's regulatory compliance and permitting experience includes mine permitting in seven states, water quality compliance, stormwater, and air quality permitting and compliance. His management experience includes creation of operating budgets and budget management, capital and operating cost estimates, sales, contract negotiation, health and safety program management, and cash management.

RELEVANT EXPERIENCE

Senior Project Manager, South Fayette Conservation Group, Gladden AMD Treatment Plant (2019 - Present) Design/Build/Operate: Design, permit, build, and operation of a water treatment facility to restore eight miles of impacted stream in Allegheny County Pennsylvania. The $13 M project will lower an existing discharging mine pool, treat the Acid Mine Drainage utilizing hydrogen peroxide as an oxidizing agent, and pump the precipitated sludge into underground mine working for disposal.

EDUCATION

B. S., Mining Engineering, 1984, Penn State University

Post-Graduate Master of Business Admin. Courses, 2004, Bowling Green State University

TRAINING/CERTIFICATIONS

Professional Engineer, PA 1990, [redacted]

Professional Engineer, OH 1993, [redacted]

Professional Engineer, WV 1991, [redacted]

US Dept. of Interior, Office of Surface Mining, Appalachian Regional Reforestation Initiative

Coaching and Leading People – Pennsylvania State University

Ground Control Safety in Underground Mining – Pennsylvania State University

Ground Control in Mining – ICGCM

Pillar Design for Room and Pillar Mining - MSHA

Mine Drainage Symposium – WV Mine Drainage Task Force

Metallurgical Coal Evaluation for Coke Making – Coaltech Petrographic Associates

OFFICE

St. Clairsville Ohio

YEARS OF EXPERIENCE

35

YEARS WITH TETRA TECH

Senior Project Manager, Exelon Power, Peach Bottom Marina Dredging (2018-2019): Performed a feasibility study into dredging operational alternatives to reduce costs. Once option was chosen performed design work, permit modifications, provided bid documents, and bid technical review.

Senior Project Manager, Guernsey Power Plant, Lands Unsuitable for Mining Petition to Ohio DNR (2018): Petitioned on behalf of Guernsey Power Station to designate plant and substation areas unsuitable for mining. The designation was requested and granted to protect the plant from potential future mining impacts and address coal ownership issues.

Senior Project Manager, Alleghany Land Trust, Wingfield Pines Inflow Reconstruction (2018-2019): Managed the project to re-establish acid mine drainage flow to passive treatment system that entailed mine dewatering, bulkhead design and installation, permitting, and creation of new gravity flow water system that would be self-sustaining into the future.

Project Engineer, Sunoco Pipeline, Current and Future Subsidence Threats to Pipeline Construction (2018): Determining the subsidence potential of areas beneath planned horizontal directional drillings of the Mariner East I and II Pipeline through investigation of previous mining and finite element analysis modeling of potential future subsidence impacts to the pipeline.

Principal Investigator, US Dept. of Energy / National Energy Technology Laboratory, Rare Earth Elements Associated with Coal and Coal By-Products (2016 to 2018): Manage federal project to identify and quantify the existence high levels of rare earth elements in coal seam and associated geology in the Northern Appalachia, Central Appalachia, and Rocky Mountain coal basins.

Senior Project Manager, West Virginia DEP, Office of Special Reclamation, Royal Coal Project (2016) Reclamation and Water Treatment: Manage engineering and reclamation design for bond forfeitures site in southern West Virginia. Site consists of coal preparation plant remnants, coarse refuse disposal, tailings disposal, rail siding, and water treatment system design to meet discharge standards.

Senior Project Manager, Ramaco Resources (2016) Due Diligence: Performed an environmental due diligence and permit review on a 76 million ton room and pillar and surface mine reserves called Elk Creek Property in the Dorothy, Williamson, Cedar Grove, Alma, Eagle, #2 Gas, and Ben's Creek seams in Logan County WV. Evaluated environmental liabilities, permit issues and time estimates, and outstanding issues.

Senior Project Manager, PaDEP Rausch Creek Plant Upgrades (2016) Capital Project: Managed upgrade and modernization project for watershed based acid mine drainage treatment facility located in eastern Pennsylvania.

Senior Project Manager, Weirton Area Port Authority (2014 to 2015) Development Project: Managed development of inland river port facility on the upper Ohio River, including facility closures, redesign, infrastructure expansion, river terminal design and permitting, community involvement, and facility re-opening.

Vice President, AK Coal Resources (2011 to 2014) Capital Project: Started and managed new underground mining division for Fortune 500 steel company. Managed $100 million vertical integration greenfield project from inception through full production. Responsible for reserve development, workforce development, engineering management, operations management, operational profit and loss, lease and contact miner management, coal preparation and tailings disposal.

Vice President, Coal Innovations (2013 to 2014) Plant and Refuse Disposal Expansion: Managed expansion project for low vol metallurgical coal preparation facility that doubled plant capacity and improved fine coal recovery. Responsible for the final design, equipment selection, along with construction and budgetary oversight. Managed expansion of coal tailings disposal site, inclusive of site selection, design, and permitting.

Vice President, AK Coal Resources (2012): M&A Lead: Lead team in evaluation, negotiation, and closure of acquisition of Coal Innovations, a coal processing and refuse disposal operating company in Somerset County, Pennsylvania.

Senior Engineering Manager, AK Coal Resources, (2011 to 2012) Capital Design: Conducted costing, site design and construction of new mining complex. Supervised site development, subcontractors, and construction. Selected and installed mining equipment, material handling systems, along with communication and monitoring systems. Certified operation of stormwater system, mine water treatment system, SPCC plan, and ground control plans.

Director of Environmental Compliance and Permitting, Murray Energy Corp. (2007 to 2011): Managed all operational and environmental permitting, compliance, and associated projects for seven operating units of a national mining corporation. Worked on state and federal levels to insure uninterrupted mining operations, and environmental compliance was maintained.

Sr. Project Manager, Ohio Valley Coal Corp. (2008 to 2011) Capital Design: Management of the Casey Run coal tailings disposal project in Ohio. Responsible for project cost analysis, site selection, impoundment design, surface water management, underdrain design, permitting, agency coordination (state and federal), mitigation, alternatives analysis, biological studies, reclamation planning, and hydrologic modeling of discharge quality.

Sr. Project Manager, Ohio Valley Coal Corp. (2010 to 2011) Waste Disposal: Management of Tailings Dam #2 expansion project. Responsible extending the life of the facility, cost analysis of alternatives, emergency response plan, stability analysis, water balance, property acquisition, permit modifications, construction, testing, and water quality management of a slurry impoundment supporting two longwall mines.

Sr. Project Manager, Murray Energy Corp. (2010 to 2011) SPCC Compliance: Developed SPCC plans for all subsidiary facilities in Ohio, West Virginia, and Pennsylvania. Facilities included underground coal mines, surface coal mines, coal preparation plants, tranloading facilities, waste disposal sites, maintenance and rebuild shops, and water treatment facilities.

Sr. Project Manager, KenAmerican Resources (2009 to 2010) Water Treatment: Led design team, managed installation and operations of Andalex AMD remediation project in Kentucky. Responsible for design of passive sulfate reducing bioreactor treatment system, approval by state and federal agencies, installation, and operation and monitoring of the system.

Sr. Project Manager, OhioAmerican Energy (2008 to 2009), Reclamation: Managed the FGD Beneficial Use demonstration project with American Electric Power (AEP) in Ohio. Permitted, designed, monitored, and constructed FGD disposal sites using FGD to reclaim highwalls on abandoned mine sites.

Sr. Project Manager, American Coal Company (2010 to 2011) Waste Disposal: Managed tailings disposal permitting in Illinois. Responsible for site selection, impoundment design, permitting, agency coordination (state and federal), mitigation, alternatives analysis, biological studies, and hydrologic modeling of discharge quality.

Sr. Project Manager, AmericanMountaineer Energy (2010 to 2011) Design and Permitting: Design and permitting of a greenfield longwall complex in West Virginia. Responsible for site design, tailings disposal site selection and design, permitting, mitigation, and rail loadout design and construction.

Project Manager, Oxford Mining (2006 to 2008) Permitting and Certification: Responsible for surface mine permitting in multiple states. Designed, constructed and certified all stormwater management systems, and annual reviews and renewals.

Vice President – Operation, MGQ Inc. (2005) Due Diligence: Acquisition of high quality dolomitic limestone reserves. Identified, verified, and acquired reserves for new quarry operations. Performed exploration, reserves evaluation, and financial analysis to determine value of assets.

Vice President - Operations, MGQ Inc. (2001 to 2005): Operational and P&L responsibility for chemical grade ore and aggregate mining and material processing in Ohio. Profitably operated the largest single aggregate producing facility (+4 Mt/yr) in the state of Ohio, serving chemical and aggregate markets by rail and truck.

Vice President - Operations, Rohr Corporation (2000 to 2001): Operational and P&L responsibility for dredging system manufacture. Designed, fabricated, and constructed highly automated custom dredging and material handling and processing systems throughout the US.

Director of Engineering and Mining Operations, Nugent Sand Corp. (1996 to 2000): Engineering, operational, and P&L responsibility for multiple inland and river dredging and material processing facilities in Kentucky and Indiana. Responsibilities included capital projects, mining, processing, and material handling system designs and their operations.

General Manager, Samco Inc. (1994 to 1996): Operational and P&L responsibility for sand and gravel dredging and material processing in northeastern Ohio. Manufactured specialty sand and gravel product on a project specific basis.

Senior Vice President, James Coal Co./Mincorp (1992 to 1994) Due Diligence: Evaluated multiple underground and surface mine reserves in southern West Virginia and eastern Kentucky. Evaluated remaining reserves, access to future reserves, environmental liabilities, permit issues and time estimates, performed financial analysis.

Senior Vice President, James Coal Co./Mincorp (1992 to 1994): Responsible for P&L for mountain top removal and contour surface mining operations in southern West Virginia. Responsible for mining and reclamation operations, safety and health compliance, mine planning, permitting, reserve acquisition, equipment selection, long and short-term mine plans, financial budgets and forecasts, and workforce development.

Vice President, Engineering, Roxcoal Inc./Mincorp (1990 to 1994) Due Diligence: Evaluated multiple underground and surface metallurgical and steam grade reserves in western Pennsylvania and northern West Virginia. Evaluated remaining reserves, access to future reserves, environmental liabilities, permit issues and time estimates, performed financial analysis.

Vice President, Engineering, Roxcoal Inc./Mincorp (1990 to 1994): Responsible for engineering for underground mining operations including mine planning, permitting, reserve acquisition, equipment selection, long and short-term mine plans, merger and acquisition due diligence, and health and safety.

Sr. Mining Engineer, Adobe Mining / Darmac Coal (1984 to 1990): Responsible for engineering support for surface and underground mining operations, mine plans, and permitting. Led reserve development team comprised of leasing agents, exploratory drilling, and engineering evaluations. Recipient of numerous mine reclamation awards

MEMBERSHIPS

American Institute of Mining, Metallurgical, and Petroleum Engineers
Society of Mining, Metallurgy & Exploration
Holmes Safety Association
    NW Ohio Chapter Founder and President
Ohio Valley Oil and Gas Association

TETRA TECH

MICHAEL S. KEARNS, P.E.

Senior Civil Environmental Engineer

EXPERIENCE SUMMARY

Michael Kearns has over 40 years of diversified engineering experience in Civil Engineering field. Mr. Kearns is a licensed Professional Engineer in the States of West Virginia, Ohio and Pennsylvania. He is also a licensed Professional Surveyor in the State of West Virginia.

Mr. Kearns' past professional experiences have largely been in the mining industry, site development, municipal engineering and highway engineering as well as environmental engineering disciplines.

Mr. Kearns has extensive experience in the areas of Surface and Underground coal mine permitting, Preparation of the Storm Water Pollution Prevention Plans and mine plan aspects which consist of the drainage and sedimentation control design, sedimentation pond design, diversion ditch design, surface mine planning, preparation of wetland and stream mitigation plans and design and evaluation of Division of Water and MSHA size impoundment structures. Mr. Kearns also performs the calculation of earthwork quantities, stability analyses of slopes and the preparation of the final plans for permitting or bidding purposes. He has also prepared Emergency Action Plans (EAP) for these types of structures and has designed large raw coal storage and refuse facilities. Mr. Kearns is an MSHA certified impoundment inspector and instructor.

Mr. Kearns has worked on hundreds of surface mine and deep mine permits over his career. As an engineering consultant in his field, Mr. Kearns coordinates all engineering work, manages budgets, schedules tasks, prepares proposals, and oversees all designs. Mr. Kearns responsibility is the coordination of the engineering regulatory aspects associated with the mining industry and requirements of West Virginia, Pennsylvania DEP and Ohio ODNR-DMRM. Permit requirements would also include property research, hydrologic investigations and determination of hydrologic consequences, stream and wetland delineation, associated 404/401 permitting, NPDES permitting, performing associated due diligence, sub-surface investigation and addressing all other state and federal regulatory

EDUCATION

B. S., Civil Engineering, 1977
West Virginia University

M.S. Civil Engineering, 1982
WV College of Graduate Studies

REGISTRATIONS AFFILIATIONS

Professional Engineer, WV
1981, [redacted]

Professional Engineer, OH
1991, [redacted]

Professional Engineer, PA
1992, [redacted]

American Society of Civil Engineers

National Society of Professional Engineers

National ASCE Committee on Employment Conditions

OFFICE

St. Clairsville Ohio

YEARS WITH TETRA TECH

1 Year

requirements. Other areas of expertise include soils engineering, water/sewer engineering, transportation engineering, and site development.

RELEVANT EXPERIENCE

Senior Civil Environmental Engineer, The Marshall County Coal Company, 6 North 6 South Bleeder Shaft Sites (2018-2019): Performed the site design for the two (2) bleeder shaft sites located in Marshall County near the Pennsylvania/West Virginia border. Design included determination of earthwork quantities, preparation of the E&S plan, determinization of permit issues and addressing slope stability for the site.

Senior Civil Environmental Engineer, The Marshall County Coal Company, 6 North No 1 Bleeder Shaft Site (2018-2019): Performed the site design for the two (2) bleeder shaft sites located in Marshall County, near Cameron, West Virginia. Design included determination of earthwork quantities, preparation of the E&S plan, determinization of permit issues and addressing slope stability for the site.

Engineering Manager, The Marshall County Coal Company, Annual Impoundment Inspections (2013-2018): Performed the Annual Impoundment Inspections of the permitted sediment ponds and submittal of the annual certifications to WVDEP.

Engineering Manager, The Ohio County Coal Company, Annual Impoundment Inspections (2013-2018): Performed the Annual Impoundment Inspections of the permitted sediment ponds and submittal of the annual certifications to WVDEP.

Engineering Manager, The Marshall County Coal Company, Package Sewer Plant Design (2018) Design and NPDES & WV Bureau of Health Permitting for a sewage treatment plant for a coal facility located in Marshall County, Franklin-Woodland area. Preparation of the contract/permit drawings and specifications.

Senior Project Manager, The Marshall County Coal Company, 5 North No 2 Portal Site Design: Performed the site design and WVDEP & NPDES permitting for a 26 acre mine portal site located in Marshall County, near Cameron, West Virginia Design included overall site design, determination of earthwork quantities, preparation of the E&S plan, determinization of permit issues and addressing slope stability for the site, Sewage Package Plant (25,000 gpd) design and permitting.

Senior Project Manager, The Marion County Coal Company, 7 North No 1 Portal Site Design: Performed the site design and WVDEP & NPDES permitting for a 32 acre mine portal site located in Marion County, West Virginia. Design included overall site design, determination of earthwork quantities, preparation of the E&S plan, determinization of permit issues and addressing slope stability for the site, Sewage Package Plant (25,000 gpd) design and permitting.

Senior Project Manager, The Tunnel Ridge Coal Company, Short Creek Preparation Plant Site: Performed the site design and WVDEP & NPDES permitting for a 40 acre coal mine preparation plant site located in Ohio County, north of Wheeling West Virginia. Design included overall site design, determination of earthwork quantities, siting of the prep plant facilities, preparation of the grading plan, design of the sediment and treatment ponds on the preparation plant site and preparation of the overall E&S plan.

Senior Project Manager, Rayle Coal Company, Short Creek, Clearview Mining Area: Preparation of a WVDEP Surface Mine and NPDES permit for mining of the No 11 coal approximately 124 acres adjacent to a coal refuse facility. Preparation of the erosion and sediment control, coordination of sub-surface investigation, prime farmland investigations, and other aspects and requirements of the surface mine permit.

Project Manager/Engineer, The Penn Ridge Coal Company, Avella Preparation Plant Site: Performed the site design and WVDEP & NPDES permitting for a 35 acre coal mine preparation plant site located in Washington County, Pennsylvania. Design included overall site design, property research, determination of earthwork quantities, siting of the prep plant facilities, preparation of the grading plan, design of the sediment and treatment ponds on the preparation plant site and preparation of the overall E&S plan.

Senior Project Manager, Confidential Client, Expert Witness/Testimony. Appeared before the Ohio Division of Reclamation Review Board as an expert witness relative to the condition and acceptability of an existing impoundment that was to remain permanent on a property owner's land.

Project Engineer, Jack A. Hamilton & Associates, Flushing, Ohio. (2003-2011) As a consultant with this firm, performed hundreds of annual pond inspections/certifications for numerous clients. Field reviewed ponds for maintenance and functionality issues or defects. Annual pond inspections were completed in West Virginia and Ohio.

Project Engineer, Rosebud Mining Company, Rosebud Prep Plant and Refuse Site : Performed the site design and WVDEP & NPDES permitting for a coal mine preparation plant site and coal refuse disposal site Design included overall site design, property research, determination of earthwork quantities, siting of the prep plant facilities, preparation of the grading plan, design of the sediment and treatment ponds on the preparation plant site and preparation of the overall E&S plan.

Project Engineer, Various Mining Companies, HEC-RAS Drainage Studies: Performed numerous flood studies associated with the mining areas that crossed existing streams. Numerous evaluations were made to determine the impact of a bridge structure installed over a streams which a hydrologic and hydraulic evaluation had to be made to determine if and to what degree the structure could potentially impact flow.

TETRA TECH

Gregory T. Yost, P.G.
Geologist III

EXPERIENCE SUMMARY

Mr. Yost has experience with subsurface geotechnical investigations, including utilizing the information obtained to implement in foundation design. Additionally, Mr. Yost has construction experience comprising of well pads and compressor discharge pads, pipeline right-of-way remediation, and landslide remediation. His experience also encompasses the evaluation of slope stability applied to cut slopes, fill slopes, and landslide susceptible slopes.

RELEVANT EXPERIENCE

SUBSURFACE EXPLORATION

Geologist/Geotechnical Inspector; Subsurface Geotechnical Investigations; Various Clients; Various Locations; 2012 to present. Assisted in the supervision of exploratory subsurface drilling and test pit investigation. Collected and logged soil and rock samples to be prepared for testing. Developed drilling plans, depth of drilling and sampling procedures. Analyzed laboratory data reports to develop site soil and rock design parameters and assisted in the preparation for geotechnical recommendations for foundation designs. Performed infiltration and percolation testing.

FOUNDATIONS

Geologist; EQM Gathering OPCO, LLC, EQT Production Company, and Range Resources; Foundation Evaluation for Storage Tank Installation; Various Sites, PA; 2018 to present. Draft and implement a subsurface exploration plan to determine soil conditions, top of rock elevations, and groundwater elevations below proposed tank locations. Analyze lab results to determine soil conditions. Calculate and assist with calculations for bearing capacity, soil settlement, and slope stability. Compile geotechnical reports including subsurface exploration conditions, summaries of laboratory results, summaries of calculations, and recommendations.

Geologist; DCNR; Ryerson Station Swimming Pool Complex; Green County, PA; 2017. Performed slope stability analysis for existing landslides below the access road to the park. Drafted design options to repair the landslide areas including engineered fill, driven piles, and a soldier pile wall. Provided calculations for a soldier pile wall for a new road construction from the main access road to the park. Provided soil settlement and bearing capacity calculations for the foundation of the proposed swimming pool and additional buildings.

Geologist/Geotechnical Inspector; PennDOT District 5-0; I-80 Bridge and Interchange Improvements Project; Monroe County, PA; 2016 to 2017. Drafted a Subsurface Exploration Plan for each phase of the project. Mr. Yost was lead inspector of the subsurface geotechnical investigation. Performed calculations for foundation design of the Lincoln Avenue Bridge and the Prospect Street Bridge. Performed calculations for the foundation design of the proposed retaining walls including the parameters for the proposed wall anchors.

Geologist; PennDOT District 6-0; Market Street Bridge over Schuylkill River; Philadelphia County, PA; 2017 Performed the calculations for the pier foundation bearing on caissons. Performed foundation calculations for the abutments, including a T-wall adjacent to the abutments.

WELL PADS AND COMPRESSOR PADS

Geotechnical Inspector; Mountain Valley Pipeline, LLC.; Bradshaw and Stallworth Compressor Stations Construction; Wetzel and Fayette Counties, WV; 2018 to 2019. Provided Inspection of toe key excavations to ensure depth and material were satisfactory for construction. Provided Inspection of reinforced soil slope to ensure a proper foundation was excavated and the correct materials were utilized and installed

EDUCATION

B.S. Geology.
West Virginia University, 2009

AREA OF EXPERTISE

Geology

REGISTRATIONS/ AFFILIATIONS

Professional Geologist, PA [redacted]

TRAINING/CERTIFICATIONS

Certified PennDOT Drilling Inspector 2014 (Current)

OSHA 40-Hour Hazwoper Training (29 CFR 1910.120(e)(8)), 2007 (Current 8-hour refresher)

OSHA 10-Hour Construction Safety Training

MSHA 24-Hour Above Ground Mining Training, 2019

MSHA Impoundment Inspection Training, 2019

OFFICE

Fairmont, WV

YEARS OF EXPERIENCE

10

YEARS WITHIN FIRM

1

CONTACT

greg.yost@tetratech.com

in the correct sequences. Worked closely with the contractor to ensure the pad was constructed as designed including confirming material lifts were of the correct size and compaction, as well as not contain large material. Provided inspection for the construction of a shotcrete soil nail wall, which included confirming soil nails were installed and grouted properly, wire mesh was installed with the appropriate overlap and suitably anchored, and ensuring shotcrete was installed to the appropriate thickness.

Geotechnical Inspector; Momentum Midstream, LLC; Compressor Discharge Pad Construction; Various Locations - WV & PA; 2014 to 2016. Provided inspection of toe key excavations to ensure depth and material were satisfactory for construction. Worked closely with the contractor to ensure the pad was constructed as designed including confirming material lifts were of the correct size and compaction as well as not contain large material. Determined when to install additional drainage in areas of saturation. Inspected the installation of Mirafi geogrid at the designed intervals.

Geologist; Acid Producing Rock Investigations, EQT Production Company and EQM Gathering OPCO, LLC, Various Locations - WV & PA; 2016 to present. Compiled desktop studies for well pads to determine the probability of encountering coal seams during construction. Upon discovering a cut area would possibly encounter a coal seam, environmental borings were selected in the corresponding areas to determine the thickness of the coal seam and obtain samples. Laboratory testing of the coal samples were performed to determine the acidity and sulfur content of the coal encountered.

Geologist; Well Pad Geotechnical Design; EQT Production Company; Various Locations, PA; 2017. Drafted and implemented a subsurface exploration boring plan to determine design parameters for cut and fill slopes. Cross sections of relevant cut and fill slopes were analyzed for slope stability from the information obtained in the subsurface exploration using the computer program GSTABL. Toe key and intermediate bench dimensions and colluvium over-excavation depths were determined to meet an allowable slope stability factor of safety.

PIPELINES

Geologist/Geotechnical Inspector; Momentum Midstream, LLC/DTE Energy; Appalachian Gathering System and Stonewall Gathering System; Monongalia, Marion, Harrison, Doddridge, Lewis, and Braxton Counties – WV; 2014 to 2016. Compiled desktop studies detailing road and stream crossings and landslide susceptible areas along the proposed pipeline right-of-way. Performed the subsurface investigation, geotechnical analysis, and assisted in the design of the pipeline road and stream crossings, including a Horizontal Directional Drill under Interstate 79 and State Route 50. Conducted soil resistivity testing for cathodic protection analysis. Performed landslide hazard investigations of the entire pipeline right-of-way before, during, and after construction.

Assisted in the initial assessment and design of roadway crossings and various slip/slide areas.

Geologist/Geotechnical Inspector; Landslide Mitigation and Remediation; Various Clients, WV, PA, and OH; 2014 to present. Assisted in the design and initial assessment of various slip/slide areas throughout miles of pipeline right-of-ways. Designed and implemented construction drawings and notes to remediate various slips/slides. Assisted in assessing multiple slips/slides to implement the appropriate corrective action. Provided construction oversight in slip/slide remediation.

TETRA TECH

Matthew T. Ridgway, EI
Civil Engineer V

EXPERIENCE SUMMARY

Mr. Ridgway is one of our top performers, offering years of diverse' experience assisting clients with management, project management, engineering and managing the design and construction of complex projects. He has a proven history as a geotechnical engineer performing and overseeing task including preliminary site investigations, engineering analysis and design and construction oversight all while maintaining cost-savings initiatives. Mr. Ridgway is an effective communicator and has a history of effectively overseeing and managing complex projects with multiple stakeholders who share different interest. He is constantly demonstrating success while dealing with complex issues in highly stressful and ever-changing environments. Mr. Ridgway has worked in a wide variety of both public and private sector projects and is able to use the diversity of his experience to provide new and creative solutions to complex problems. As an involved manager who takes ownership and pride in his work, he will ensure that project teams have the resources and support needed to not only meet but exceed all expectations

RELEVANT EXPERIENCE

EARTH RETENTION, SLIDE INVESTIGATION AND MITIGATION

Project Engineer; Slide Mitigation; Confidential Client; West Virginia. Performed investigation on an active slide along an active railway. Completed stability analyses for repair recommendations.

Project Engineer; Bridge Failure Investigation; Pennsylvania DOT; Pennsylvania. Managed and performed the installation process for multiple instruments installed as part of an investigation on the failure of an adjacent structure. Instrumentation installed includes piezometers, in-place inclinometers, multi-point borehole extensometers and integrated data loggers.

Project Manager; Slip Repair; Confidential Client; Pennsylvania. Conducted the field investigation into the location and cause of an 80-foot tall slope failure adjacent to a stream in north-central Pennsylvania. Performed stability analyses and prepared construction drawings for mitigation and repair.

Project Manager; Slip Repair; Confidential Client; Pennsylvania. Completed field investigation and prepared permits, conducted stability analysis and prepared construction drawings for a 70-foot high slope failure adjacent to a stream in northeastern Pennsylvania

Project Engineer; Pipeline Slope Failure Remediation; Confidential Clients; Pennsylvania and West Virginia. Conducted over 30 field evaluations and investigations of slope failures along pipeline right of ways and on well pad sites. On selected sites conducted stability analysis and oversaw field repairs.

Project Engineer; Reinforced Steepened Slope; West Virginia Department of Highways; West Virginia. Performed design and stability analysis for a fifty-foot-tall 1500-foot-long reinforced steepened slope.

Project Manager; Slip Repair; Confidential Client; Pennsylvania. Completed field investigation and prepared permits, conducted stability analysis and prepared construction drawings for a 20-foot-high slope failure caused by stream erosion of the toe in northeastern Pennsylvania.

Project Manager; High Wall Stability; Confidential Client; Pennsylvania. Performed field investigation of existing bedrock to create a 50-foot-tall highwall adjacent to a property boundary in Williamsport, Pennsylvania. Design plans included a falling rock retention system.

Project Manager; Slip Repair; Confidential Client; Pennsylvania. Conducted the field investigation into the location and cause of a 40 foot tall slope failure in Washington Pennsylvania. Performed stability analyses and prepared construction drawings for mitigation and repair.

EDUCATION

BS, Civil Engineering, West Virginia University, 2013

BS, Mining Engineering, West Virginia University, 2013

AREA OF EXPERTISE

Civil/Geotechnical Engineering

Instrumentation

Mine Site Reclamation

Slope Stability

Deep Foundation

Land/Site Development

Forensic Investigation

Geostructures

OFFICE

Morgantown, WV

YEARS OF EXPERIENCE

6

YEARS WITHIN FIRM

1

CONTACT

matthew.ridgway@tetratech.com

Project Engineer; Reinforced Steepened Slope; West Virginia Department of Highways; West Virginia. Performed design and stability analysis for a fifty-foot-tall 1500 foot long reinforced steepened slope.

Project Manager; Retaining Wall Design; West Virginia Department of Highways; West Virginia. Managed the geotechnical investigation and design for this site along in Harrison County, West Virginia. Investigation included locating borings on an active slip for the purposes of designing a retaining wall of approximately 15 feet in height and 40 feet in length. Calculated forces on the wall and analyzed for design and selection of beams for a pile and lagging wall using LPILE. Complete stability analysis using Slope/W and RocScience Slide software.

Project Manager; Retaining Wall and Fill Instrumentation; Yeager Airport; West Virginia. Managed and performed the installation process for several instruments in a large fill area that included two retention walls. Instrumentation installed included piezometers, shape arrays, strain gauges, strand meters, multi-point borehole extensometers, data loggers and threads.

Project Manager; Retaining Wall Design; West Virginia Department of Highways; West Virginia. Managed the geotechnical investigation and design for this site along in Harrison County, West Virginia. Investigation included locating borings on an active slip for the purposes of designing a retaining wall of approximately 25 feet in height and 30 feet in length. Calculated forces on the wall and analyzed for design and selection of beams for a pile and lagging wall using LPILE. Complete stability analysis using Slope/W and RocScience Slide software.

Project Engineer; Abutment Wall Design; West Virginia Department of Highways; West Virginia. Performed calculations for forces on bridge abutments walls and designed abutment walls and foundations.

Project Engineer; Slope Failure Investigation; Confidential Clients; West Virginia. Worked with Expert Witness to conduct field and forensic investigations of 5 slope failures in West Virginia, including Yeager Airport's 210' high fill slope. Conducted all field investigation and performed reverse engineering to determine cause and location of failure. Provided the Expert Witness with data for testimony.

Project Manager – Retaining Wall Design; City of Morgantown; West Virginia. Managed the geotechnical investigation and design for this site along in the city of Morgantown, West Virginia. Investigation included locating borings on an active slip for the purposes of designing a retaining wall of approximately 20 feet in height and 155 feet in length. Calculated forces on the wall and analyzed for design and selection of beams for a pile and lagging wall using LPILE. Complete stability analysis using Slope/W and RocScience Slide software.

Project Manager; Camden Street Storage Tunnel, Clark Construction; Maryland. Managed and performed the installation process for multiple piezometers and multi-point borehole extensometers for a utility storm drainage tunnel.

Project Manager; Retaining Wall Design; Allegheny County; Maryland. Managed the geotechnical investigation and design for this site along in Allegheny County, Maryland. Investigation included locating borings on an active slip of coal refuse for the purposes of designing a retaining wall of approximately 15 feet in height and 176 feet in length. Calculated forces on the wall and analyzed for design and selection of beams for a pile and lagging wall using LPILE. Complete stability analysis using Slope/W and RocScience Slide software.

Project Manager; Retaining Wall Failure, Confidential Client; West Virginia. Managed and performed the installation process for the investigation into a retention wall failure including the installation of multiple in-place inclinometers.

Project Engineer; Retention Wall; Confidential Client; Ohio. Oversaw the re-design and construction of a pile and lagging retention wall on a country road in Monroe County, Ohio.

Project Manager; Retaining Wall Design; Fairmont Regional Medical Center; West Virginia. Managed the geotechnical investigation and design for this site in the city of Fairmont. West Virginia. This project consisted of the selection and design of a segmented block retaining as well as the foundation recommendations for the wall.

AML CONSULTANT QUALIFICATION QUESTIONNAIRE

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
AML CONSULTANT QUALIFICATION QUESTIONNAIRE

Attachment "A"

PROJECT NAME	DATE (DAY, MONTH, YEAR)	FEIN
Camden (Wilson) Landslide	26 November, 2019	95-4148514

1. FIRM NAME	2. HOME OFFICE BUSINESS ADDRESS	3. FORMER FIRM NAME
Tetra Tech, Inc	320 Adams St Fairmont, WV 26554	

3. HOME OFFICE TELEPHONE 4. 304-534-4021	5. ESTABLISHED (YEAR) 6. 1966	6. TYPE OWNERSHIP Corporation	6a. WV REGISTERED DBE (Disadvantaged Business Enterprise) NO

7. PRIMARY AML DESIGN OFFICE: ADDRESS/ TELEPHONE/ PERSON IN CHARGE/ NO. AML DESIGN PERSONNEL EACH OFFICE
Pittsburgh, 661 Andersen Dr, Pittsburgh, PA 15220/412-921-7090/Mark Speranza, PE/ 116 People

8. NAMES OF PRINCIPAL OFFICERS OR MEMBERS OF FIRM	8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS
Mr. Mark Perry, PE - Unit President	Mr. Farley Wood, PE - Project Manager

9. PERSONNEL BY DISCIPLINE

— ADMINISTRATIVE 2012	— ECOLOGISTS 152	— LANDSCAPE ARCHITECTS 19	— STRUCTURAL ENGINEERS 98
— ARCHITECTS 130	— ECONOMISTS 138	— MECHANICAL ENGINEERS 70	— **SURVEYORS 60**
— **BIOLOGIST 300**	— ELECTRICAL ENGINEERS 60	— **MINING ENGINEERS 70**	— TRAFFIC ENGINEERS
— **CADD OPERATORS 170**	— ENVIRONMENTALISTS 746	— PHOTOGRAMMETRISTS 12	— OTHER 13,714
— CHEMICAL ENGINEERS 304	— ESTIMATORS 271	— PLANNERS: URBAN/REGIONAL96	
— **CIVIL ENGINEERS 588**	— **GEOLOGISTS 367**	— SANITARY ENGINEERS70	
— CONSTRUCTION INSPECTORS61	— HISTORIANS 3	— SOILS ENGINEERS34	— TOTAL PERSONNELL 20,000 Personnel Company Wide
— DESIGNERS	— HYDROLOGISTS 115	— SPECIFICATION WRITERS 140	
— DRAFTSMEN 200			

TOTAL NUMBER OF WV REGISTERED PROFESSIONAL ENGINEERS IN PRIMARY OFFICE: 5
***RPEs other than Civil and Mining must provide supporting documentation that qualifies them to supervise and perform this type of work.**

10. HAS THIS JOINT-VENTURE WORKED TOGETHER BEFORE? X☐ YES ☐ NO

11. OUTSIDE KEY CONSULTANTS/SUB-CONSULTANTS ANTICIPATED TO BE USED. Attach "AML Consultant Qualification Questionnaire".

NAME AND ADDRESS	SPECIALTY	WORKED WITH BEFORE
NAME AND ADDRESS: Shallenberger Construction, Inc 195 Enterprise Lane Connellsville, PA 15425	SPECIALTY: Geotechnical Drilling	WORKED WITH BEFORE __X__ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No
NAME AND ADDRESS:	SPECIALTY:	WORKED WITH BEFORE _____ Yes _____ No

12. A. Is your firm's personnel experienced in Abandoned Mine Lands Remediation/Mine Reclamation Engineering?

YES Description and Number of Projects: Tetra Tech has extensive experience with AML/Mine Reclamation Engineering. Tetra Tech is currently working on several AML projects in several states. Tetra Tech has also worked on AML related projects within the state of West Virginia. In the last 5 years Tetra Tech has performed 20+ of these types of projects.

B. Is your firm experienced in Soil Analysis?

YES Description and Number of Projects: Tetra Tech has a whole team dedicated to Geotechnical investigations including soil analysis. In the last 5 year this team has performed 20+ projects specifically associated with Soil Analysis.

C. Is your firm experienced in hydrology and hydraulics?

YES Description and Number of Projects: Tetra Tech has performed several project looking at hydrology and hydraulics, specifically Tetra Tech specializes in mine pool analysis and AMD treatment systems. In the last 5 years Tetra Tech has performed 20+ projects looking at hydrology and hydraulics.

D. Does your firm produce its own Aerial Photography and Develop Contour Mapping?

YES Description and Number of Projects: Tetra Tech does produce its own Aerial Photography with the use of drone technology and we use that photography to develop contour mapping. We use this service across all disciplines and industries with hundreds of flights and maps developed on a yearly basis.

E. Is your firm experienced in domestic waterline design? (Include any experience your firm has in evaluation of aquifer degradation as a result of mining.)

YES Description and Number of Projects Tetra Tech's large size and extensive resources provides for skilled individuals in various disciplines, Tetra Tech does have experience in domestic waterline design in conjunction with other projects. Tetra Tech also has on staff PhD hydrologist Eric Perry who retired from Office of Surface Mining where his responsibility was hydraulic monitoring of mine pools and effects of mining on aquifers.

F. Is your firm experienced in Acid Mine Drainage Evaluation and Abatement Design?

YES Description and Number of Projects: Tetra Tech has a whole team dedicated to Acid Mine Drainage projects, we are currently working on 5 projects specifically looking at AMD treatment with 10+ projects completed in the last 5 years.

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR AML PROJECT DESIGN** (Furnish complete data but keep to essentials)

NAME & TITLE (Last, First, Middle Int.)	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE:	YEARS OF AML RELATED DESIGN EXPERIENCE:	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:
Gray, Thomas A. PE	46	46	

Brief Explanation of Responsibilities

Mr. Gray has more than 40 years of professional experience. He is a technical expert in mining engineering, mine reclamation, coal ash disposal and utilization, watershed and ecosystem restoration, mine subsidence, acid mine drainage remediation, mine stabilization via grouting and abandoned mine fire mitigation. Mr. Gray specializes in active and abandoned mining projects and with infrastructure projects that have mining related concerns. His project management responsibility has included construction, engineering, regulatory compliance, and research and development. He has been responsible for the successful completion of many unique projects.

EDUCATION (Degree, Year, Specialization)
BS, 1973 Mining Engineering/MS 1977 MBA

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
SME	PE in WV (1988), PA (1978), OH (2009), MD (1989), VA (1980)

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR AML PROJECT DESIGN** (Furnish complete data but keep to essentials)

NAME & TITLE (Last, First, Middle Int.)	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE:	YEARS OF AML RELATED DESIGN EXPERIENCE:	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:
Wood, Farley R.	35	35	

Brief Explanation of Responsibilities

Farley Wood has over 35 years of diverse experience in the mining industry. His experience includes engineering, operations, project management, environmental and safety compliance, permitting, mergers and acquisitions, and executive level leadership.

EDUCATION (Degree, Year, Specialization)
BS, 1985 Mining Engineer

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
SME	PE in WV (1998), PA (1993), OH (1998)

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR AML PROJECT DESIGN** (Furnish complete data but keep to essentials)

NAME & TITLE (Last, First, Middle Int.)	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE:	YEARS OF AML RELATED DESIGN EXPERIENCE:	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:
Michael Kearns	40	40	20

Brief Explanation of Responsibilities

Mr. Kearns has over 40 years of diversified engineering experience in Civil Engineering Field. Past professional experiences have largely been in the mining industry, site development, municipal engineering and highway engineering as well as environmental engineering disciplines.

EDUCATION (Degree, Year, Specialization)

BS Civil Engineering 1977, MS Civil Engineering 1982

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
ASCE, NSPE	PE - WV (1987), OH (1991), PA (1992)

13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES **RESPONSIBLE FOR AML PROJECT DESIGN** (Furnish complete data but keep to essentials)

NAME & TITLE (Last, First, Middle Int.)	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE:	YEARS OF AML RELATED DESIGN EXPERIENCE:	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:
Matthew Ridgway	6	6	3

Brief Explanation of Responsibilities

Mr. Ridgway is a Civil Engineer with more than 6 years of engineering experience, including managing the design and construction of complex construction projects. His professional focus has been on geotechnical engineering and his expertise includes preliminary site investigation, design, and construction oversight.

EDUCATION (Degree, Year, Specialization)

BS Civil engineering & BS Mining Engineering 2019

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
NA	NA

14. PROVIDE A LIST OF SOFTWARE AND EQUIPMENT AVAILABLE IN THE PRIMARY OFFICE WHICH WILL BE USED TO COMPLETE AML DESIGN SERVICES

Microsoft Office Professional and Microsoft Project

Bentley Pond Pack (Haestad methods)

Adobe Photoshop

Adobe Acrobat

AutoCAD Map 3D

AutoDesk Civil 3D

ESRI ArcGIS

ESRI ArcView

Bently Flow Master (Haested Methods)

Bentley HEC-Pack

STBL5M

Groundwater Vistas

GMS

Autodesk Storm and Sanitary Analysis

Hydro CAD

15. CURRENT ACTIVITIES ON WHICH YOUR FIRM IS THE DESIGNATED ENGINEER OF RECORD

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	NATURE OF YOUR FIRM'S RESPONSIBILITY	ESTIMATED CONSTRUCTION COST	PERCENT COMPLETE
Wingfield Pines Inflow Reconstruction Project, Upper St. Clair Township, Allegheny County PA	Allegheny Land Trust 416 Thorn Street Sewickley, PA 15143	Prime Contractor	$1 Million	95%
Gladden AMD Treatment Plant, South Fayette Township, Allegheny County PA	South Fayette Conservation Group 515 Millers Run Road Morgan, PA 15064	Prime Contractor	12$ Million	25%
WVDEP OSR Royal Coal Bond Forfeiture Fayette County WV	WVDEP OSR 1159 Nick Rahall Greenway Fayetteville, WV 25840	Prime Contractor	$250,000	90%
Kempton Sludge Disposal Line Garrett County MD	Maryland Department of the Environment 160 S Water Street Frostburg, MD 21532	Prime Contractor	$385,000	90%
Glenn Springs Holdings Bird Mine Treatment, Tire Hill Pennsylvania	Glenn Springs Holdings 5 Greenway Plaza, Suite 10 Houston, TX 77046	Prime Contractor	Confidential	Ongoing
Quakake Treatment Plant Carbon County Pennsylvania	PADEP BAMR 2 Public Square 5th Floor Wilkes-Barre, Pennsylvania 18701	Prime Contractor	$1.2 Million	60%
Blacklick Creek Treatment Facility	PADEP BAMR 400 Market Street Harrisburg, PA 17106	Prime Contractor	$160,000	75%

TOTAL NUMBER OF PROJECTS: Tetra Tech is currently conducting thousands or projects nationwide for the purpose of the EOA only a sample is provided

TOTAL ESTIMATED CONSTRUCTION COSTS: $+15 Million

16. CURRENT ACTIVITIES ON WHICH YOUR FIRM IS SERVING AS A SUB-CONSULTANT TO OTHERS

PROJECT NAME, TYPE AND LOCATION	NATURE OF FIRMS RESPONSIBILITY	NAME AND ADDRESS OF OWNER	ESTIMATED COMPLETION DATE	ESTIMATED CONSTRUCTION COST	
				ENTIRE PROJECT	YOUR FIRMS RESPONSIBILITY
NA	NA	NA	NA	NA	NA

17. COMPLETED WORK WITHIN LAST 5 YEARS ON WHICH YOUR FIRM WAS THE DESIGNATED ENGINEER OF RECORD

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	ESTIMATED CONSTRUCTION COST	YEAR	CONSTRUCTED (YES OR NO)
WV Land Stewardship Larosa Fuels Marion County WV	WV Land Stewardship Corporation 709 Beechurst Ave Morgantown, WV 26505	$136,000	2018	Yes
Dolph Underground Mine Fire, Lackawanna County, PA	PADEP BAMR 400 Market Street Harrisburg, PA 17106	$15 Million	2018	Yes
Scenic Rail Road Subsidence Evaluation Garrett County Maryland	Maryland Department of the Environment 160 S Water Street Frostburg, MD 21532	$114,000	2017	Yes
Pipeline Slip Investigation Belmont County Ohio	Confidential Client	Confidential	2017 & 2018	Yes
Frush Enterprises Bond Forfeiture Harrison County WV	WVDEP OSR 1159 Nick Rahall Greenway Fayetteville, WV 25840	$152,000	2017	Yes
Buffalo Coal Mt. Storm, WV	WV Land Stewardship Corporation 709 Beechurst Ave Morgantown, WV 26505	$269,170	2018	Yes
Rasuch Creek Treatment Plant Upgrades Schuykill County PA	PADEP BAMR 2 Public Square 5th Floor Wilkes-Barre, Pennsylvania 18701	$200,000	2018	Yes
Tetra Tech had conducted thousands or projects nationwide for the purpose of the EOA only a sample is provided				

18. COMPLETED WORK WITHIN LAST 5 YEARS ON WHICH YOUR FIRM HAS BEEN A SUB-CONSULTANT TO OTHER FIRMS (INDICATE PHASE OF WORK FOR WHICH YOUR FIRM WAS RESPONSIBLE)

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	ESTIMATED CONSTRUCTION COST OF YOUR FIRM'S PORTION	YEAR	CONSTRUCTED (YES OR NO)	FIRM ASSOCIATED WITH

19. Use this space to provide any additional information or description of resources supporting your firm's qualifications to perform work for the West Virginia Abandoned Mine Lands Program.

Tetra Tech has extensive knowledge and vast resources to allow for a comprehensive approach to any problem. Tetra Tech works extensively with Abandoned Mine Lands and is well versed on solutions to any problem. Tetra tech has a strong presence in West Virginia in Fairmont and Charleston, with offices in Pittsburgh, PA and St. Clairsville, OH regularly performing work in the state. The Tetra Tech Pittsburgh office has worked with eWVDEO on several Special Reclamation projects through out the state.

20. The foregoing is a statement of facts.

Signature: _____ Title: Project Manager

Printed Name: Farley R. Wood

Date: 11-25-2019

AML RELATED PROJECT EXPERIENCE MATRIX

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C=Corp. P=Personnel *	Additional Info Provided in Section (s) **	PROJECT EXPERIENCE REQUIREMENTS															PRIMARY STAFF PARTICIPATION/CAPACITY *** M=Management P=Professional					
			Abandoned Surface Mine Reclamation	Abandoned Deep Mine Reclamation	Portal/Shaft Closure	Hydrologic/Hydraulic Design/Eval.	Remining Evaluation	Mine/Refuse Fire Abatement	Subsidence Investigation Mitigation	Hazardous Waste Disposal	Project Specifications	Water Quality Evaluation/Mitigation/Replacement	Construction Inspection/Management	Water Treatment	Equipment/Structure Removal	Stream Restoration	Geotechnical/Stability	Tom Gray, PE	Farley Wood, PE	Michaeal Kearns PE	Matthew Ridgeway	Other Project Team Personnel	Other Tetra Tech Personnel
Wingfiield Pines Infolw Reconstruction	C&P	Yes				X					X	X	X	X				M	P	P		P	M
WVDEP OSR Roayl Coal Bond Forfeture	C&P	Yes	x								x						X	M	P	P		P	M
Kempton Sludge Disposal Line	C&P	Yes												X				M	P			P	M
MDE Scenic Rail Road Subsidence Evaluation	C&P	Yes							X								X	M	P			P	M
PADEP Black Lick Creek	C&P	Yes												X				M				P	M
PADEP Dolph Mine Fire	C&P	Yes						X										M				P	P
PADEP Rausch Creek	C&P	Yes												X	X			M	P			P	P
WVDEP OSR Frush Enterprises Bond Forfeture	C&P	Yes	X														X	M	P			P	P
WVLSC Larosa Fuels	C&P	Yes	X											X				M				P	P
Gladden AMD Treatment Plant	C&P	Yes											X	X	X			M	P			P	P
Glenn Springs Holdins Bird Mine Treatment	C&P	NO									X	X	X	X				M				P	P
Quakake Treatment Plant	C&P	NO										X		X				M				P	P
WVLSC Buffalo Coal	C&P	No	X															M				P	P

*** List whether project experience is corporate or personnel based or both.**

**** Use this area to provide specific sections or pages if needed for reference.**

Per comment from John E and Gary. Too wordy. Refined text sent via email on April 16, 2018

Ryan,

The attached letter verifies NRG-HCG's commitment to the voluntary program conditions under 40 CFR § 423.13(g)(3)(i) [redacted]. The letter also includes a milestone schedule for ZLD implementation to account for the anticipated Station modifications required to manage water for the various operational conditions. [redacted]. However, more detailed analysis and testing is required to confirm the hydraulic capacity of the system to equalize flow and to understand and address the vulnerabilities of the NIDs when it starts receiving full flow from Unit 3. The Station also foresees that during the study period, additional water reuse strategies will be need to be considered as part of the Station-wide compliance; and treatability studies would be necessary during design/implementation phase to manage the changes in water chemistry to the NIDs and Outfall 001.

The Station has initiated contracts to begin studies in the summer of 2018 following release of the draft permit. The schedule includes one year of studies to capture the seasonal operations, identify the system vulnerabilities, and develop treatment strategies. Following the studies, the schedule includes one year of engineering design with permit modification applications submitted within the year for storage and treatment system modifications. It is assumed permits are issued in early 2021 and the project will be out for bid in late 2021. Assuming the project is awarded in early 2022, construction would initiate summer of 2022 with one year to complete followed by startup, testing, and commissioning by the end of 2023.

The ELG compliance schedule allows for compliance with the proposed WQBELs within the timeframe allowed under § 92a.51 for both Outfall 027 and 001. The Station proposes that compliance with the water quality based effluent limits at Outfall 027 and 001 shall be achieved by the earlier of December 31, 2023 or five (5) years after the effective date of this permit.

Ryan,

Homer City is opting to voluntarily achieve the BAT effluent limits in 40 CFR § 423.13(g)(3)(i) by completely eliminating the FGD wastewater discharge via routing to the NID scrubbers for evaporation. We understand that under the voluntary incentive program the new BAT limits do not apply until December 31, 2023. With the Station committing to ZLD, it is requested that the compliance schedule for the WQBELs, including TMDL, be extended to coincide with the ELG implementation schedule to accommodate the timeframe provided by the ELG to facilitate implementation of the ZLD strategy.

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Alma.Rettinger@tetratech.com

From: Decker, Ryan [mailto:rydecker@pa.gov]
Sent: Thursday, March 29, 2018 11:48 AM
To: Rettinger, Alma <Alma.Rettinger@tetratech.com>
Cc: Cline, Gary <Gary.Cline@nrg.com>; Ritts, Adam <Adam.Ritts@nrg.com>; Shimko, Jonathan <Jonathan.Shimko@tetratech.com>
Subject: RE: Homer City Generating Station - PA0005037 Application Update Memo

Thank you, Alma. I do have a couple of follow-up questions regarding the choice of ZLD.

Just to confirm my understanding for ZLD: Homer City's intent is for FGD wastewater to be consumed/evaporated within the NIDS from which there will be no discharge. Is that correct? I just want to clarify that point because reusing federally-regulated wastewater within another process removes the requirement for compliance with limits on the reused wastewaters only if there is no discharge from the reuse. For example, ash landfill leachate is reused as makeup water and later discharged as blowdown, which is why it is still subject to effluent limits on combustion residual leachate.

Also, is there a schedule for implementation of ZLD? New WQBELs were proposed for Outfall 027, so it may be reasonable to set a compliance date for those WQBELs that coincides with the expected cessation of Outfall 027's discharge. Bear in mind the regulatory requirement in § 92a.51 (pertaining to schedules of compliance) to achieve compliance as soon as possible, but in no case later than five years.

DEP's agreement with Sierra Club regarding reissuance of NPDES permits for coal-fired power plants would have us draft (or redraft) the NPDES permit for Homer City by June 30, 2018. That would be the latest date for a draft permit, but I'm shooting for sometime in May.

Please call if you'd like to discuss.

Ryan C. Decker, P.E. | Environmental Engineer
Department of Environmental Protection | Clean Water Program
Southwest Regional Office
400 Waterfront Drive | Pittsburgh, PA 15222
Phone: 412.442.4144 | Fax: 412.442.5885
www.dep.pa.gov

From: Rettinger, Alma [mailto:Alma.Rettinger@tetratech.com]
Sent: Wednesday, March 28, 2018 5:04 PM
To: Decker, Ryan <rydecker@pa.gov>
Cc: Cline, Gary <Gary.Cline@nrg.com>; Ritts, Adam <Adam.Ritts@nrg.com>; Shimko, Jonathan <Jonathan.Shimko@tetratech.com>
Subject: RE: Homer City Generating Station - PA0005037 Application Update Memo

Ryan,

On behalf of NRG Homer City Services, LLC, please note our follow-up response to Comment #2 provided in **blue** below your comment regarding the Station's preferred path forward for the FGD wastewater.

2. *Homer City previously considered a zero-liquid discharge (ZLD) approach for FGD wastewater. There is a brief discussion in the memo about Homer City evaluating options to comply with the ELG (presumably including not employing ZLD depending on the outcome of EPA's reconsideration of the rule). However, if Homer City does not plan to proceed with ZLD for FGD wastewater at this time, then, before we can publish a revised draft permit, Homer City must decide which of the regulatory compliance options for BAT it plans to follow. Under the current ELG, the BAT options include:*

    - *If Homer City opts to voluntarily achieve the BAT effluent limits in 40 CFR § 423.13(g)(3)(i), then those limits must be met by December 31, 2023.*
    - *If Homer City does not opt to voluntarily meet the paragraph (g)(3)(i) limits for FGD wastewater, then the less stringent BAT limits in § 423.13(g)(1)(i) must be met as soon as possible beginning November 1, 2020, but no later than December 31, 2023. If Homer City wants more time to comply past November 1, 2020, then justification for a later date (up to December 31, 2023) should be provided consistent with the defined phrase "as soon as possible" in 40 CFR § 423.11(t).*

    Please let me know which of these options Homer City proposes to implement. If there is no selection, then we would default to the § 423.13(g)(1)(i) BAT limits and a November 1, 2020 compliance date.

    Note that DEP plans to include a reopener provision in the permit allowing Homer City to apply to modify the FGD wastewater limits or the schedule of compliance in response to any changes EPA would make to the rule. Additionally, please note that all existing technology-based limits on FGD wastewater discharges in Homer City's current permit will be maintained in the renewed permit unless they are superseded by more stringent BAT limits from 40 CFR Part 423. Pursuant to EPA's anti-backsliding regulation (40 CFR § 122.44(l)), existing BPJ TBELs generally cannot be relaxed in response to the promulgation of new or updated effluent guidelines with less stringent limits.

    03/28/2018 Response: Homer City plans to proceed with ZLD for the FGD wastewater.

Please let us know if this satisfies your questions needed to complete the draft permit and what your anticipated schedule is for releasing a draft for our review.
Thank you.

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Alma.Rettinger@tetratech.com

From: Rettinger, Alma
Sent: Monday, February 26, 2018 3:15 PM

To: 'Decker, Ryan' <rydecker@pa.gov>
Cc: Cline, Gary <Gary.Cline@nrg.com>; Ritts, Adam <Adam.Ritts@nrg.com>; Shimko, Jonathan <Jonathan.Shimko@tetratech.com>
Subject: RE: Homer City Generating Station - PA0005037 Application Update Memo

Ryan,

On behalf of NRG Homer City Services, LLC, please see our written responses provided below in **blue** under each of your comments to the Homer City Generating Station Application Update Memo (PA0005037). Please let us know if you have further questions or need additional information.

Thank you.

Alma Rettinger, PE | Civil Engineer | Power & Water Solutions Group
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From: Decker, Ryan [mailto:rydecker@pa.gov]
Sent: Friday, January 19, 2018 3:44 PM
To: Cline, Gary <Gary.Cline@nrg.com>; Ritts, Adam <Adam.Ritts@nrg.com>; Shimko, Jonathan <Jonathan.Shimko@tetratech.com>; Rettinger, Alma <Alma.Rettinger@tetratech.com>
Subject: Homer City Generating Station - PA0005037 Application Update Memo

Gary, et.al.,

I started reviewing the NPDES permit update memo and I have some comments/questions:

1. The memo references a number of attachments, but there were no attachments to what I received. Were the attachments sent with the memo?

   Response: Attachments were delivered on January 22, 2018.

2. Homer City previously considered a zero-liquid discharge (ZLD) approach for FGD wastewater. There is a brief discussion in the memo about Homer City evaluating options to comply with the ELG (presumably including not employing ZLD depending on the outcome of EPA's reconsideration of the rule). However, if Homer City does not plan to proceed with ZLD for FGD wastewater at this time, then, before we can publish a revised draft permit, Homer City must decide which of the regulatory compliance options for BAT it plans to follow. Under the current ELG, the BAT options include:

   - If Homer City opts to voluntarily achieve the BAT effluent limits in 40 CFR § 423.13(g)(3)(i), then those limits must be met by December 31, 2023.

- If Homer City does not opt to voluntarily meet the paragraph (g)(3)(i) limits for FGD wastewater, then the less stringent BAT limits in § 423.13(g)(1)(i) must be met as soon as possible beginning November 1, 2020, but no later than December 31, 2023. If Homer City wants more time to comply past November 1, 2020, then justification for a later date (up to December 31, 2023) should be provided consistent with the defined phrase "as soon as possible" in 40 CFR § 423.11(t).

Please let me know which of these options Homer City proposes to implement. If there is no selection, then we would default to the § 423.13(g)(1)(i) BAT limits and a November 1, 2020 compliance date.

Note that DEP plans to include a reopener provision in the permit allowing Homer City to apply to modify the FGD wastewater limits or the schedule of compliance in response to any changes EPA would make to the rule. Additionally, please note that all existing technology-based limits on FGD wastewater discharges in Homer City's current permit will be maintained in the renewed permit unless they are superseded by more stringent BAT limits from 40 CFR Part 423. Pursuant to EPA's anti-backsliding regulation (40 CFR § 122.44(l)), existing BPJ TBELs generally cannot be relaxed in response to the promulgation of new or updated effluent guidelines with less stringent limits.

Response: We are currently evaluating these options and will let you know by mid-March how Homer City plans to proceed.

3. The Q7-10 estimate for Two Lick Creek in the memo, if I understand correctly, includes flow from Outfall 001. While Outfall 001 would contribute to stream flow downstream of Outfall 001, the stream flow that provides assimilative capacity and that mixes with Outfall 001 would not include flow from Outfall 001. Therefore, using the numbers in Table 2 of the memo, the Q7-10 of Two Lick Creek would be 20.77 cfs (42+0.2+0.12-21.55). PENTOXSD and the temperature spreadsheet both add Q7-10 flow and discharge flow together when performing downstream mixing calculations, so including Outfall 001 flow in the Q7-10 stream flow would count Outfall 001's flow twice.

   Response: We concur with PADEP's analysis and understand that Two Lick Creek's Q7-10 will be revised to 20.8 cfs, which will modify the PENTOXSD and temperature water quality analysis. As you will note, DEP's Thermal Discharge Limit Calculation Spreadsheet will result in lower temperature limits due to the lower Q7-10 rate, with temperature limits dropping below 86F in November and December. The Station requests that PADEP reduce the maximum discharge rates for Outfall 001 for those months to 2,700 gpm and 2,600 gpm, respectively, to maintain an 86F temperature limit.

   In addition, per your inquiry regarding sampling of Two Lick Creek and Blacklick Creek, the attached laboratory report includes results for a sample collected at the Two Lick Creek intake location in 2011 for the permit renewal. Note that the iron, aluminum, and manganese concentrations in the Two Lick Creek sample are substantially below the water quality standards. For Blacklick Creek, no samples have been collected.

4. The memo requests the addition of TSS and O&G limits to Outfall 001 due to the routing of IWT effluent from former Outfall 003 to the cooling tower clarifier. While that is the simplest way to

implement the ELG and I agree that the limits are necessary, I don't think imposing those limits as concentration limits at Outfall 001 is consistent with the ELG.

EPA discusses in the ELG Development Document how discharges of federally-regulated waste streams are still subject to their corresponding effluent limits in the ELG, even if the waste streams are transferred to another process or operation prior to discharge. This requirement is stated in 40 CFR § 423.13(n). So, under that section, low volume wastes transferred to the Cooling Tower Clarifier are subject to low volume waste limits; treated coal combustion residual leachate transferred to the Cooling Tower Clarifier is subject to coal combustion residual leachate limits, etc. Imposing ELG limits at Outfall 001 to control these individual waste streams introduces a number of complicating factors.

First, coal pile runoff contributes to flow through the IWT and that wastewater is subject to a TSS limit of 50 mg/L. So, if coal pile runoff is not monitored separately before mixing with low volume wastes, then the maximum TSS limit for IWT effluent would conservatively be as low as 50 mg/L (as proposed in the 2014 draft permit at Outfall 003) or somewhere between 50 mg/L and 100 mg/L using a mass balance calculation. Alternatively, mass limits could be calculated using the flow of coal pile runoff (i.e., total coal pile runoff flow up to the 10-year, 24-hour storm water volume from the desilting ponds) and the 50 mg/L TSS limit and the flow and concentrations limits for the low volume wastes treated by IWT. Mass limits calculated that way would apply solely to IWT effluent.

If the IWT mass limits were moved to Outfall 001, then they would have to be modified further because there are other federally-regulated waste streams comprising the cooling tower blowdown discharged at Outfall 001. A portion of the blowdown is treated coal combustion residual leachate from former Outfall 004, so TSS and O&G mass limits would have to be calculated for that wastewater and then added to the mass limits calculated for IWT. However, the resultant mass limits imposed at Outfall 001 would probably be too low because makeup water to the Cooling Tower Clarifier also includes water from Two Lick Creek, leachate from the Coal Cleaning Plant, and storm water from the Greenhouse Pond. Those sources are not regulated by 40 CFR Part 423, but may contribute to the TSS and O&G loading at Outfall 001, so separate mass allowances would have to be determined for those waste streams (with presently unknown concentrations since there are no ELG limits on those wastewaters).

To avoid these complications, it seems prudent to me to maintain internal monitoring points for IWT effluent (at former Outfall 003?) and coal combustion residual leachate (at former Outfall 004?) before those wastewaters are directed to the Cooling Tower Clarifier. Those monitoring locations could be renumbered (e.g., IMP 101 and 201) and would not be subject to water quality limits.

Response:

- IWT (former Outfall 003): On October 16, 2015, PADEP approved the Station's request to monitor the IWT Recycle discharge at Outfall 001 as a mixed wastewater effluent with weighted flow TSS and O&G limits rather than monitoring at an IMP before the IWT effluent is recycled. This allowed the Station to retire the sand filters at IWT and provide substantially greater treatment of the IWT effluent before discharging through Outfall 001. The Station understands that the purpose of the IMPs are to ensure that the IWT effluent is treated and not just diluted to meet the ELGs applicable the IWT effluent. In a

letter to PADEP on October 15, 2015, the Station presented the additional treatment the IWT effluent would receive through recycling to demonstrate that the IWT effluent would not rely on dilution to meet the ELG limits. The Station also proposed weighted flow TSS and O&G limits, which were approved in the October 16, 2015 TDA. For the permit renewal, the Station requests to maintain the existing TSS and O&G effluent limits at Outfall 001 per the October 16, 2015 TDA.

- Former Outfall 004: To satisfy the intent of the ELG, the Station agrees to monitor the combustion residual leachate for TSS and O&G before it comingles with the cooling tower system. This monitoring point would not be subject to water quality limits. To clarify, none of the emergency overflows from the leachate ponds flow into Outfall 004.

I haven't read the entire memo yet, so I may have more comments and questions as I prepare a revised draft permit. If you have any questions about the items listed above or want to discuss, please let me know.

Ryan C. Decker, P.E. | Environmental Engineer
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