

Expression of Interest: DEP16072
Donnie Thorn Highwall Design








Prepared for:

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, West Virginia 25305-0130

Point of Contact:

Mr. Thomas Gray, PE
Tetra Tech, Inc.
661 Andersen Drive
Pittsburgh, PA 15220
(412) 921-8794
Email: tom.gray@tetratech.com

TETRA TECH

State of West Virginia
Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

Solicitation

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ADDRESS CORRESPONDENCE TO ATTENTION OF:
FRANK WHITTAKER
304-558-2316

VENDOR
RFQ COPY
TYPE NAME/ADDRESS HERE
TETRA TECH, INC.
661 ANDERSEN DRIVE
PITTSBURGH, PA 15220

SHIP TO
ENVIRONMENTAL PROTECTION
DEPARTMENT OF
OFFICE OF AML&R
601 57TH STREET SE
CHARLESTON, WV
25304 304-926-0499

DATE PRINTED
12/20/2012

BID OPENING DATE: 01/29/2013 BID OPENING TIME 1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		906-29		
	DONNIE THORN HIGHWALL DESIGN					
	EXPRESSION OF INTEREST					
	THE WEST VIRGINIA PURCHASING DIVISION, FOR THE AGENCY, THE WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, IS SOLICITING EXPRESSIONS OF INTEREST FOR PROFESSIONAL ENGINEERING DESIGN SERVICES AND CONSTRUCTION MONITORING SERVICES AT THE DONNIE THORN HIGHWALL PROJECT IN PRESTON COUNTY, WEST VIRGINIA, PER THE FOLLOWING BID REQUIREMENTS AND ATTACHED SPECIFICATIONS.					
	****** THIS IS THE END OF RFQ DEP16072 ****** TOTAL:					

SIGNATURE	TELEPHONE	DATE
[signature]	(412) 921-7090	1/25/13
TITLE: VICE PRESIDENT	FEIN: 95-4148514	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO SOLICITATION, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

TETRA TECH, INC.
(Company)

Mark T. Perry
(Authorized Signature)

MARK PERRY - UNIT PRESIDENT
(Representative Name, Title)

(412) 921-7090 (412) 921-4040
(Phone Number) (Fax Number)

1/25/13
(Date)

TETRA TECH

January 25, 2013

Mr. Frank Whittaker
Department of Administration
Purchasing Division
2019 Washington Street, East, P.O. Box 50130
Charleston, West Virginia 25305-0130

Subject: RFQ #DEP16072: Donnie Thorn Highwall Design

Dear Mr. Whittaker:

Tetra Tech is pleased to submit our Expression of Interest to perform design services in reply to RFQ #DEP16072 for the State of West Virginia. As outlined in our Expression of Interest, Tetra Tech and its personnel have completed work on ***thousands of mine reclamation projects***. These projects have included services that will be needed for this project. Our project team has the required expertise to support the full scope of work, including the design of drainage conveyances, installation of mine seals, subsidence area reclamation, highwall reclamation, refuse/GOB reclamation, and revegetation of disturbed areas.

This project will be managed out of Tetra Tech's Pittsburgh, Pennsylvania area offices with the support of the Fairmont, West Virginia office. Tetra Tech has a total of six AML design teams (a team consisting of one engineer and one CAD professional) in the Pittsburgh area offices. In addition, our firm has four more civil engineers within these offices. Tetra Tech also has more than 650 mining and civil engineers (hundreds of which are registered Professional Engineers), and 170 CAD professionals companywide that are available to support this work as needed.

Our experienced team is led by Mr. Gregory Hynes, PE. Mr. Hynes has more than 22 years of AML reclamation experience and water resources engineering. He has managed or supported more than 30 AML projects for the WVDEP. Most recently, Mr. Hynes managed three highwall projects for the agency in 2012 – the Waitman-Barbe Highwall, the Colliers Sportsman's Club Highwall, and the Simpson Creek Highwall. He has also managed several projects for other state agencies including PADEP and the Ohio Department of Natural Resources, preparing design calculations, cost estimates, plans, and technical specifications for abandoned mine land reclamation.

Mr. Thomas Gray, PE, Tetra Tech's Energy and Natural Resources Manager, will be our Project Advisor. Mr. Gray is a licensed Professional Engineer in five states, including West Virginia, and has participated in more than 100 mining projects throughout his career. He has recently managed three AML projects for the WVDEP – the Fisher Run, Tunnelton, and the Paint Branch Mine Portal Closure Design projects.

As requested by the RFP we have provided one original submittal, one copy, and one copy on CD-ROM. We appreciate this opportunity to provide this proposal, and look forward to answering any questions you may have. If you should require any additional information, please contact me at (304) 534-4021.

Sincerely,

Gregory A Hynes

Mr. Gregory Hynes, PE
Project Manager

Thomas A Gray

Mr. Thomas Gray, PE
Energy and Natural Resources Manager

Enclosures

Tetra Tech, Inc.
661 Andersen Drive, Pittsburgh, PA 15220
Tel (412) 921-7090 www.tetratech.com

TETRA TECH

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"The availability of knowledge, experience, and innovation is beyond that of any other current AML consultant."

Vicky Zimmerman
Wyoming Abandoned Mine Land Department

Addressing Scope of Work

ADDRESSING THE SCOPE OF WORK

Tetra Tech has a strong technical knowledge of the services required for this project including:

Design of Drainage Conveyances
In 2012, Tetra Tech was named as the #1 engineering firm by the *Engineering News-Record* for water related services for the ninth consecutive year. Many members of our team have significant experience with design of open channels, culverts, and mine water collection and conveyance systems.

Installation of Mine Seals
In the past three years, Tetra Tech has completed three closure design projects for the WVDEP for mine portals allowing acid mine drainage to exit and flow off-site. The Tunnelton Mine Portal Closure Design project included the design of wet and dry seals for two mine portals on two separate private parcels. The Fisher Run Mine Portal Closure Design project included the design of the closure of seven mine portals allowing acid mine drainage to exit into a small stream. For the Paint Branch Mine Portal Closure Design project, Tetra Tech developed an innovative design for the closure of three portals. The project was constructed and adopted by the WVDEP at other sites.

Tetra Tech also recently prepared mine seal designs for three shafts for use at an active coal mine during closure for a coal company in Aledonia, Ohio and completed the design of four internal mine bulkheads at the same Ohio coal mine. The proposed project manager also has experience with mine seals in West Virginia including wet seals, modified seals, and bat gates.

Subsidence Area Reclamation
Tetra Tech engineers have performed subsidence studies at mines worldwide and have utilized computer programs to predict subsidence and define the subsidence basin both for strain and displacement. Tetra Tech can also provide simple and economical solutions to subsidence problems commonly found at AML sites.

Highwall Reclamation
Tetra Tech is very experienced in preparing design plans for highwall elimination. Tetra Tech primarily uses AutoCAD and AutoDesk Civil 3D for state-of-the-art site design to prepare a reclamation plan based on achieving a balance of cut and fill while minimizing total excavation requirements. Many members of our project team have significant highwall reclamation experience while working for other firms including our project manager, Gregory Hynes, PE and our project advisor, Thomas Gray, PE, including preparing plans compatible with current West Virginia Construction Stormwater General Permit requirements.

In particular, Mr. Hynes has managed or supported numerous highwall reclamation projects for the WVDEP. In 2012, he managed three AML projects for the agency – the Waitman-Barbe Highwall, the Colliers Sportsman's Club Highwall, and the Simpson Creek Highwall.

"Tetra Tech has always been professional, performed excellent work, and I would recommend them for mining related projects in the future."

John DeFranco
Acid Mine Drainage Industries, Inc.

Attachment B

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
AML CONSULTANT QUALIFICATION QUESTIONNAIRE Attachment "B"

PROJECT NAME	DATE (DAY, MONTH, YEAR)		FEIN
Donnie Thorn Highwall Design	25, January, 2013		95-4148514
1. FIRM NAME Tetra Tech, Inc.	2. HOME OFFICE BUSINESS ADDRESS 661 Andersen Drive Pittsburgh, PA 15220		3. FORMER FIRM NAME Tetra Tech NUS, Inc. NUS Corporation NUS Environmental Corporation
4. HOME OFFICE TELEPHONE (304) 534-4021	5. ESTABLISHED (YEAR) 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

Foster Plaza 7, 661 Andersen Drive, Pittsburgh, PA 15220 / (412) 921-7090 / Mark Speranza, PE / (16 AML design personnel - 10 Design Engineers and 6 CADD Professionals)

8. PRINCIPAL OFFICERS OR MEMBERS OF FIRM	8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS
Mr. Mark Perry, PE – Unit President Mr. Mikel Lutman, RPF – Fairmont Office Manager	

9. PERSONNEL BY DISCIPLINE

2012 ADMINISTRATIVE	152 ECOLOGISTS	19 LANDSCAPE ARCHITECTS	98 STRUCTURAL ENGINEERS
130 ARCHITECTS	138 ECONOMISTS	54 MECHANICAL ENGINEERS	**60 SURVEYORS**
300 BIOLOGIST	60 ELECTRICAL ENGINEERS	**70 MINING ENGINEERS**	75 TRAFFIC ENGINEERS
170 CADD OPERATORS	746 ENVIRONMENTALISTS	12 PHOTOGRAMMETRISTS	7855 OTHER
304 CHEMICAL ENGINEERS	271 ESTIMATORS	96 PLANNERS: URBAN/REGIONAL	
588 CIVIL ENGINEERS	**367 GEOLOGISTS**	70 SANITARY ENGINEERS	
61 CONSTRUCTION INSPECTORS	3 HISTORIANS	34 SOILS ENGINEERS	239 TOTAL PERSONNEL (IN PRIMARY OFFICE)
_ DESIGNERS (counted in CADD)	115 HYDROLOGISTS	140 SPECIFICATION WRITERS	
_ DRAFTSMEN (counted in CADD)			14,000+ Personnel company-wide

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? ☐ YES ☐ NO N/A

11. OUTSIDE KEY CONSULTANTS/SUB-CONSULTANTS ANTICIPATED TO BE USED. Attach AML "Consultant Qualification Questionnaire".		
NAME AND ADDRESS: Test Boring Services, Inc. 140 Mong Road Scenery Hill, PA 15360	SPECIALTY: Drilling	WORKED WITH BEFORE __X__ Yes (with individual staff) _____ No
NAME AND ADDRESS: Sturm Environmental Services P.O. Box 650 Bridgeport, WV 26330	SPECIALTY: Laboratory analysis (coal, soil, water)	WORKED WITH BEFORE __X__ Yes (with individual staff) _____ No
NAME AND ADDRESS: Double J Drilling 1207 Williamstown Pike Williamstown, WV 26187	SPECIALTY: Drilling	WORKED WITH BEFORE __X__ Yes _____ No
NAME AND ADDRESS: Blue Mountain Aerial Mapping 11023 Mason-Dixon Highway Burton, WV 26562	SPECIALTY: Aerial mapping	WORKED WITH BEFORE __X__ Yes ___ No
NAME AND ADDRESS: Industrial Lab Analysis 65 36th Street Wheeling, WV 26003	SPECIALTY: Laboratory Analysis (water)	WORKED WITH BEFORE __X__ Yes (with individual staff) _____ No
NAME AND ADDRESS: Test Boring Services, Inc. 140 Mong Road Scenery Hill, PA 15360	SPECIALTY: Drilling	WORKED WITH BEFORE __X__ Yes (with individual staff) _____ No
NAME AND ADDRESS: Terra Testing, Inc. 260 Meadowlands Blvd. Washington, PA 15301	SPECIALTY: Geotechnical drilling	WORKED WITH BEFORE __X__ Yes _____ No
NAME AND ADDRESS: TRIAD Engineering 219 Hartman Run Road Morgantown, WV 26505	SPECIALTY: Surveying, Drilling	WORKED WITH BEFORE __X__ Yes _____ No

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

YES Description and Number of Projects: Tetra Tech and its consultants have completed **over 300 abandoned mine land projects** - Attachment C is only a partial listing. Our Project Manager has been working on abandoned mine reclamation projects for the past 26 years, with many in West Virginia for the WVDEP. Tetra Tech has been involved with mine reclamation for many years throughout the western U.S. and is providing similar services in the Appalachian coal fields.

B. **Are your firm's personnel experienced in Soil Analysis?**

YES Description and Number of Projects: Tetra Tech has conducted **thousands of soil investigations** worldwide that included sampling and analysis. Along with this site work, we have provided thousands of reports presenting the results of the investigations. We have extensive specialized experience and technical competence in providing soil sampling and analysis services, including **more than 6,000 environmental site characterizations (including at mining sites) and more than 1,000 geotechnical investigations.** We have trained and experienced field sampling crews available to support this project.

C. **Are your firm's personnel experienced in hydrology and hydraulics?**

YES Description and Number of Projects: Tetra Tech has over **three decades of experience** in hydrology and hydraulics having completed **hundreds of projects.** Our expertise and knowledge in evaluating hydrologic systems is applied to specific water resource project types including water resource and flood damage assessment, flood control designs (including channels, levees, detention basins and bank protection, hydraulic structure design, erosion and sedimentation studies, stream restoration and wetland design, dam and levee safety evaluations, reservoir operation/optimization studies, flood-control and flood management studies and mapping, development of flood warning systems, dam break flood studies and contingency planning, stormwater drainage design, surface and groundwater supply analysis. The basis of these hydrologic studies is the application of HEC software such as HEC-HMS, GeoHMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-5, HEC-DSS, and COED.

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

YES Description and Number of Projects: Tetra Tech employs 15 GIS and CADD personnel in its Pittsburgh and Fairmont offices and has all necessary software for map development. Our firm hires subcontractors when necessary for aerial photography to develop contour maps. Tetra Tech has completed aerial photography and/or contour mapping for **over 100 projects**.

E. **Are your firm's personnel experienced in domestic waterline design? (Include any experience in evaluation of aquifer degradation as a result of mining.)**

YES Description and Number of Projects: Our project manager, Gregory Hynes, PE, has completed **more than ten water line projects for the WVDEP**. Tetra Tech has extensive expertise in modeling, designing, and building reliable, save and cost-effective water transmission and distribution systems. Our experience encompasses all aspects of transmission and distribution systems, including large diameter water mains, distribution piping, booster pumping stations, storage tanks and metering facilities. We have performed **hundreds of domestic water line design projects** nationwide for many municipalities and water authorities.

F. **Are your firm's personnel experienced in Acid Mine Drainage Evaluation and Abatement Design?**

YES Description and Number of Projects: Tetra Tech and its personnel have extensive acid mine drainage evaluation and abatement design experience. Our firm has **recently completed more than ten acid mine drainage evaluation/abatement design projects** and our personnel have completed **more than 30 acid mine drainage and abatement projects** at other firms. Our project advisor and project engineer Mr. Thomas Gray also managed an open-end contract for the Maryland Bureau of Mines, which included over 16 projects relating to mining, acid mine drainage treatment, and mine reclamation.

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:
Hynes, Gregory, P., PE Project Manager	22	22	26

Brief Explanation of Responsibilities

Mr. Hynes has more than 22 years of experience in abandoned mine land reclamation, land restoration, mining permits, and environmental and water resources engineering. He has managed or supported more than 30 AML projects for the WVDEP. Most recently, Mr. Hynes managed three AML projects for the agency in 2012 – the Waitman-Barbe Highwall, the Colliers Sportsman's Club Highwall, and the Simpson Creek Highwall. He has also managed several projects for other state agencies including PADEP and the Ohio Department of Natural Resources, preparing design calculations, cost estimates, plans, and technical specifications for abandoned mine land reclamation. Mr. Hynes has also prepared permit applications and construction level drawings and specifications for proposed surface mine facilities in West Virginia and Pennsylvania. Projects included permitting and reclamation of various mining related surface facilities.

EDUCATION (Degree, Year, Specialization)
MS, 1997, Civil Engineering / BE, 1987, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Professional Engineer, 1998, West Virginia Professional Engineer, 1993, Pennsylvania Professional Engineer, 1998, Ohio

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 Project Advisor / Mining Engineer	27	39	21

Brief Explanation of Responsibilities

Mr. Gray has more than 39 years of mining engineering experience and has managed numerous AML projects for the West Virginia Department of Environmental Protection. His experience for the agency includes the Paint Branch mine portals design, Tunnelton mine portals design, Fisher Run mine portals design, Omega mine grouting project, Owings Mine reclamation, Majesty Mine reclamation, Godby Branch water supply extension, and Left Hand Fork Refuse fire control. Since 2000, Mr. Gray has participated in more than 50 AMR projects and has managed 30 projects for the OSM. Currently, Mr. Gray oversees two statewide open-end contracts with the Pennsylvania Department of Environmental Protection. He also currently manages projects involving mineral rights for the West Virginia Division of Highways. Mr. Gray co-authored the chapter entitled, 'Mine Closure, Sealing, and Abandonment' in SME's Mining Engineering Handbook.

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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
Society of Mining Engineers - Distinguished Member Society of American Military Engineers Engineering Society of Western Pennsylvania	Professional Engineer, 1988, West Virginia Professional Engineer, 1978, Pennsylvania Professional Engineer, 1980, Virginia Professional Engineer, 2009, Ohio Professional Engineer, 1989, Maryland

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:
Duffer, George, PE, PS Civil Engineer / Surveyor	42	42	0

Brief Explanation of Responsibilities

Mr. Duffer has more than 42 years of experience in preparing surface and deep mine coal permits that include detailed reclamation plans, massive earth moving and environmental assessments. His experience has included preparing permits for three major proposed sites (an industrial site, a shopping center, and a golf course) that were originally coal surface mine sites. Mr. Duffer also has surveying experience and has been involved with the planning and demolition of a variety structures and buildings. He is also Tetra Tech's corporate office registered surveyor in West Virginia.

EDUCATION (Degree, Year, Specialization)

BS, 1970, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Professional Engineer, 1974, West Virginia Professional Surveyor, 1995, West Virginia

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 ESGIN EXPERIENCE:
Smith, Terence, PE Mining Engineer	3	22	22

Brief Explanation of Responsibilities

Mr. Smith has more than 34 years of experience in mining engineering and management, and water and wastewater design engineering and project management. Mr. Smith previously served as a longwall maintenance supervisor and currently serves as a project manager for two statewide mining engineering abandoned mine land reclamation design contracts with PADEP. He recently provided design services for a mine discharge reclamation project for the South Fayette Conservation Group. His mining expertise also includes longwall mining, coal preparation plant and coal refuse disposal supervision, surface mine permitting, mine operations evaluations, compliance evaluations, economic feasibility analysis, cost estimating and project management in the coal mining industry.

EDUCATION (Degree, Year, Specialization)
BS, 1978, Mining Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
Society of Mining, Metallurgy, and Exploration American Society of Civil Engineers Water Environment Federation	Professional Engineer, 1992, Pennsylvania

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:
Verma, Pete, PE Geotechnical/Structural Engineer	33	34	0

Brief Explanation of Responsibilities

Mr. Verma has over 33 years of experience in geotechnical design, and civil design for a variety of projects. He currently serves as a project engineer on two statewide abandoned mine land reclamation contracts with PADEP. He has extensive and diversified experience in the areas of geotechnical engineering, slurry walls, coal refuse and spoil pile remediation, MSE, walls, surface water hydrology, hydrogeological analysis, general civil and concrete design, subsurface investigation, foundations design, retaining walls, sheet pile design, cellular structures and cofferdam design, groundwater analysis and dewatering, materials processing, and construction support in West Virginia, Pennsylvania, and Ohio. Mr. Verma has authored various mining-related publications and presentations.

EDUCATION (Degree, Year, Specialization)

MS, Civil Engineering / MS, Civil Engineering / BS, Integrated Engineering and Mining Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
American Society of Civil Engineers International Society for Soil Mechanics and Geotechnical Engineers	Professional Engineer, 1988, PA Professional Engineer, 2003, MD Professional Engineer, 2008, VA

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:
Lutman, Mikel, RPF Mining Specialist	21	21	17

Brief Explanation of Responsibilities

Mr. Lutman is the Manager of Tetra Tech's Fairmont, West Virginia office. He has more than 34 years of professional experience including more than 25 years in management or supervisory roles. Mr. Lutman has more than 21 years of Abandoned Mine Land related design experience and has completed a variety of mining projects throughout his career including mine fires, coal reserve evaluations, permitting, development of mine plans, hydrological studies, acid mine drainage treatment plans, involvement with start-up operations and daily mining activities, and the supervision of drilling and exploratory options. He currently serves as a mining and natural resources specialist on two statewide abandoned mine land reclamation contracts with PADEP.

EDUCATION (Degree, Year, Specialization)

MS, 1977, Forest Hydrology / BS, 1975, Forest Resources Management

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
West Virginia Forestry Association Society of American Foresters	Registered Professional Forester American Tree Farm Inspector Registered Wastewater Treatment Plant Operator

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:
Cullen, Kevin, T., PE Civil and Environmental Engineer	0	11	0

Brief Explanation of Responsibilities

Mr. Cullen is a project manager and civil engineering working in Tetra Tech's Fairmont, West Virginia office. He is a registered Professional Engineer in West Virginia and has been responsible for environmental compliance through the WVDEP and EPA for a number of projects. In addition, Mr. Cullen has served as a supervisor on several road construction, engineering, and environmental control for projects while working for the West Virginia Division of Highways. On these projects, he has worked with local and WVDEP representatives to ensure the proper sediment and erosion control was in place such as seeding, ditch checks, and sediment ponds. Mr. Cullen has also been responsible for controlling run-off and discharge on projects.

EDUCATION (Degree, Year, Specialization)

BS, 2001, Civil/Environmental Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
	Professional Engineer, 2006, West Virginia Professional Engineer, 2005, Virginia

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:
Mertz, Robert, C., PE Civil Engineer	0	30	0

Brief Explanation of Responsibilities

Mr. Mertz is a civil engineer with more than 30 years of professional experience in project management, engineering, construction management, and quality assurance/quality control. He is a West Virginia registered Professional Engineer and has supported numerous civil engineering projects throughout his career. He has provided geotechnical and sedimentation and erosion control analyses, provided engineering design, developed sedimentation and erosion control plans, provided specifications, and QA/QC support for numerous projects and has also had coordination with state DEP agencies.

EDUCATION (Degree, Year, Specialization)

ME, 1991, Civil Engineering
BS, 1983, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Professional Engineer, 1997, West Virginia Professional Engineer, 1997, Ohio Professional, Engineer, 1990, Pennsylvania

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:
Ludwig, Jon Water Resources Specialist	0	16	0

Brief Explanation of Responsibilities

Mr. Ludwig is the director of Tetra Tech's Charleston, WV office of TMDL and Water Resources Center. He is a senior environmental scientist experience providing technical and management support for clients in the areas of water resources, watershed and water quality assessment, watershed modeling and Total Maximum Daily Load (TMDL) development. In support of EPA and the WVDEP Division of Water and Waste Management (DWWM), he has served as the Project Manager in the development of over 3,500 EPA-approved TMDLs in West Virginia. He currently serves as the Project Manager for the existing TMDL contract with the WVDEP DWWM that includes the development of TMDLs for total iron, total manganese, dissolved aluminum, pH, selenium, fecal coliform bacteria, and biological impairments throughout the State of West Virginia. He currently serves as a water resources specialist on two statewide abandoned mine land reclamation contracts with PADEP.

EDUCATION (Degree, Year, Specialization)

MS, 1997, Environmental Pollution Control / BS, 1995, Environmental Science

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
American Water Resources Association Water Environment Federation	N/A

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:
Whitney, Joshua, PE Mining Engineer	5	5	0

Brief Explanation of Responsibilities

Mr. Whitney has more than five years of environmental, geologic, and mining-related experience including mine design, operation permitting, environmental impact analyses, low seam surface and underground coal mine planning, open pit aggregates, underground salt mining, and slope/highwall stability analysis. He currently serves as a project engineer on two statewide abandoned mine land reclamation contracts with PADEP. His experience also includes collaboration with federal and state regulatory agencies. His software expertise includes AutoCAD, Auto Desk Land Desktop, Carlson, ArcGIS, Colorado Rockfall Simulation Program, NIOSH ARMPS, Rock Pack III, REAME Stability Analysis, Microsoft Office, Golden Software Surfer and Voxler, Culvert Master and HY-8, SEDCAD, SEDIMOT, and Flowmaster.

EDUCATION (Degree, Year, Specialization)

MS, 2009, Mining and Minerals Engineering
BS, 2007, Mining and Minerals Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Professional Engineer, 2013, Pennsylvania

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 EXPERIENCE:
Trexler, Heather, PG Project Geologist	0	9	0

Brief Explanation of Responsibilities

Ms. Trexler has more than nine years of hydrologic, geologic, and mining-related. Project activities for mining development include the preparation of geologic and hydrologic sections of permits to state agencies for longwall expansions, new room and pillar mines, refuse expansions, and associated surface activities. She currently serves as a project geologist on two statewide abandoned mine land reclamation contracts with PADEP. Additional technical projects include the evaluation of current and potential mine pools, reviewing current and potential impacts to water resources, managing mining compliance sampling programs and evaluating large-volume water quality analysis.

EDUCATION (Degree, Year, Specialization)

MS, 2003, Geology / BS, 2001, Geology

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
Society for Mining, Metallurgy & Exploration Pennsylvania Coal Mining Institute of America Marcellus Shale Coalition	Professional Geologist, 2007, Pennsylvania

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: 0
Mussetter, Robert, PhD, PE Stream Channel Designer / Hydraulic Engineer	31	31	

Brief Explanation of Responsibilities

Dr. Mussetter has extensive experience with relocation and restoration of mine waste-impacted streams both within the US and internationally. Overall, he has more than 31 years of experience in stream channel design, and the application of hydrology, hydraulics and sediment transport to river engineering and restoration, channel bed and bank stabilization, habitat restoration for both warm- and cold-water fish species, riparian restoration, flood management, and levee stability analysis. Dr. Mussetter has extensive experience with hydrologic (HEC-1, HMS), one-and two-dimensional hydraulic (HEC-2, UNET, HEC-RAS, FLO-2D, RMA-2, SRH-2D) and sediment transport (HECRASv.4.0, HEC-6T, SAM) models and their application to channel restoration and stabilization.

EDUCATION (Degree, Year, Specialization)

PhD, 1989, Civil Engineering
MS, 1982, Civil Engineering
BS, 1976, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Professional Engineer, 1983 – 2006, WI, LA, TX, SD, AZ, CO, MT, NM, CA, and ID

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.) Trigg, Brandon Geologist	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 0	YEARS OF AML RELATED DESIGN EXPERIENCE: 0	YEARS OF DOMESTIC WATERLINE EXPERIENCE: 0
Brief Explanation of Responsibilities Mr. Trigg has provided drilling inspection for geotechnical subsurface investigations for proposed gas well pad sites in southeastern Ohio and western Pennsylvania. He has also provided water sampling, collection, and reporting services for residential water supplies, streams, wells, and springs.			
EDUCATION (Degree, Year, Specialization) BS, 2012, Geology			
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)		

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.) Durso, Robert, W., EIT Civil Engineer	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 1	YEARS OF AML RELATED DESIGN EXPERIENCE: 3	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
Brief Explanation of Responsibilities Mr. Durso is a civil/design engineer with experience in a variety of mining-related projects. His experience includes sampling of mine water discharges, estimating mine pool volumes and water balances, and analyzing lab results. Mr. Durso is also involved with the submittal of mining permits to PADEP. He also currently serves as a project engineer on two statewide abandoned mine land reclamation contracts with PADEP.			
EDUCATION (Degree, Year, Specialization) BS, 2010, Civil and Environmental Engineering			
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS N/A	REGISTRATION (Type, Year, State) Engineer-in-Training, 2011, Pennsylvania		

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 EXPERIENCE:
Strakal, Carl, J. Civil Engineer	10	10	0

Brief Explanation of Responsibilities

Mr. Strakal has more than ten years of mining-related experience. He has performed water quality monitoring per DEP compliance regulations. His experience includes completing and submitting various surface (SMP) and deep mine (CMAP) permitting modules. He has also completed and submitted surface mining related permits to the WVDEP utilizing the e-permitting process. In addition, Mr. Strakal is a certified WVDEP Pre-Blast Surveyor. He currently serves as a project engineer on two statewide abandoned mine land reclamation contracts with PADEP.

EDUCATION (Degree, Year, Specialization)

BS, 2002, Civil Engineering Technology

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	Certified Pre-Blast Surveyor, 2012, West Virginia (WVDEP)

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: 0
Moore, Kevin, M. GIS Specialist	5	9	

Brief Explanation of Responsibilities

Moore has more than 11 years of professional experience working with Geographic Information Systems (GIS) for environmental and engineering projects. He has provided GIS support for mine pool evaluation studies and water sourcing projects. He currently serves as the primary GIS specialist on two statewide abandoned mine land reclamation contracts with PADEP. He also has extensive knowledge of ESRI desktop GIS software, including ArcView 3x, ArcGIS 9.x, and relevant extensions. Mr. Moore uses these tools to generate maps and layouts, perform spatial analysis & geoprocessing, edit features, and build geodatabases. He applies these GIS products and services to projects pertaining to a variety of projects. Mr. Moore routinely integrates CADD datasets into GIS environments, having experience in AutoCAD and Microstation platforms. He is also well-versed in GPS data processing and uses Trimble Pathfinder Office and TerraSync software for GPS data post-processing and conversion to GIS-compatible formats.

EDUCATION (Degree, Year, Specialization)

BA, 2002, Geography

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

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 EXPERIENCE:
Wilkes, Samuel, P., PWS Wetland Scientist	10	10	0

Brief Explanation of Responsibilities

Mr. Wilkes is an environmental scientist providing technical support to clients, such as the WVDEP and the WVDHHR, US Forest Service, Bureau of Land Management, and the EPA. He also provides technical support to clients pertaining to abandoned mine site investigations, abandoned mine land inventories, contaminant transport in surface waters, environmental contamination, and potentially responsible party searches. Mr. Wilkes has experience in investigating hard rock mines and mill sites for contaminants such as arsenic, copper, cyanide, lead, mercury, uranium, zinc, and organic compounds. He is proficient in contaminant source identification and characterization, site assessments contaminant migration pathways, and customized surface water modeling for abandoned mine sites.

EDUCATION (Degree, Year, Specialization)

MS, 2003, Environmental Science and Policy / BS, 1996, Earth and Environmental Science

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
Society of Wetland Scientists	Professional Wetland Scientist, 2003, US Certified Forest Stand Delineator and Conservation Planner, 2003, MD

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: 0
Coffman, James, D. Geophysicist	2	16	

Brief Explanation of Responsibilities

Mr. Coffman has more than 16 years of experience leading, performing, and interpreting results for hundreds of surface and borehole geophysical surveys. His experience in environmental geophysics is comprehensive and he has also performed this work for abandoned mine land projects, targeting mine voids, including work for the Virginia Department of Mines, Minerals, and Energy (DMME). He currently serves as the primary geophysicist on two statewide abandoned mine land reclamation contracts with PADEP. His concentration has been in surveys using electromagnetics (EM), ground penetrating radar (GPR), magnetics, seismic refraction, electrical resistivity, borehole geophysics, and utility location equipment.

EDUCATION (Degree, Year, Specialization)

MS, Geophysics, 1997 / BS, Geology, 1995

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

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 EXPERIENCE:
Hoppe, Ben CAD Designer	4	10	0

Brief Explanation of Responsibilities

Mr. Hoppe is a CAD Designer with over ten years of relevant experience and is Tetra Tech's Pittsburgh office CAD manager. He has significant experience in providing CAD support for abandoned mine land reclamation projects and has supported three such efforts for the West Virginia Department of Environmental Protection and other projects in Pennsylvania. Mr. Hoppe currently serves as a CAD designer on two statewide abandoned mine land reclamation contracts with PADEP. His expertise includes all phases of civil design work including but not limited to, site grading, proposed roadway geometry layout, utility layout and Erosion & Sediment Control BMP Design. Mr. Hoppe is capable of providing accurate earthwork volumes for designs, layout of sewer and storm sewer systems (gravity and low pressure) using 3D models and complex grading designs using 3D civil software ensuring accuracy. Also capable of providing 3D models of piping systems for water and wastewater facilities utilizing a variety of different types of pipes, valves and mechanical equipment.

EDUCATION (Degree, Year, Specialization)

AAS, 2004, Drafting

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

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: 0
Najeski, Nichole CAD Designer	3	3	

Brief Explanation of Responsibilities

Ms. Najeski has more than three years of experience in Computer Aided Drafting and Design. She has supported numerous abandoned mine land projects and her responsibilities have included creating and modifying elevations, level drawings, base levels, and site plans for wireless infrastructure; performing quality assurance tasks; maintaining cycle times for normal course of business during integration; communicating with area representatives and field technicians to resolve conflicting data; reviewing site data for accuracy; and preparing cross sections, site location maps, surface soil and groundwater sampling maps, and conceptual site model figures.

EDUCATION (Degree, Year, Specialization)

AS, 2010, Drafting

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

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 EXPERIENCE:
Moore, Zachary CAD Designer	4	7	0

Brief Explanation of Responsibilities

Mr. Moore is a CAD Designer with more than six years of relevant experience. He has supported numerous abandoned mine land reclamation projects throughout his career. His expertise also includes different phases of civil design work including but not limited to, site grading, proposed roadway geometry layout, bridge design and rehabilitation, maintenance of traffic plans. He has experience with programs such as AutoCAD 2000/2004/2007, AutoCAD Civil 3D, Autodesk Architectural Desktop, Microstation V8, Microstation XM, Microsoft Word, Excel, PowerPoint, Outlook, Adobe Photoshop, and 3D Studio Max.

EDUCATION (Degree, Year, Specialization)

AAS, 2006, Drafting

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

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: 0
Kramer, Carly, N. CAD Designer	4	6	

Brief Explanation of Responsibilities

Ms. Kramer has more than six years of experience in Computer Aided Drafting and Design. She has supported numerous mining-related and abandoned mine land projects throughout her career. Her responsibilities have included creating and modifying elevations, level drawings, base levels, and site plans for wireless infrastructure; performing quality assurance tasks; maintaining cycle times for normal course of business during integration; communicating with area representatives and field technicians to resolve conflicting data; reviewing site data for accuracy; and preparing cross sections, site location maps, surface soil and groundwater sampling maps, and conceptual site model figures.

EDUCATION (Degree, Year, Specialization)

AS, 2007, Drafting

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
N/A	N/A

14. PROVIDE A LIST OF SOFTWARE AND EQUIPMENT AVAILABLE IN THE PRIMARY OFFICE WHICH WILL BE USED TO COMPLETE AML DESIGN SERVICES
TR-55, STABL5, HEC-HMS, GeoHMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-5, HEC-DSS and COED
Microsoft Office Professional and Microsoft Project
Adobe Photoshop
Adobe Acrobat Version 9.0
AutoCAD Map 3D 2008 / AutoCAD 2008
AutoDesk Civil 3D 2007
ESRI ArcGIS 9.2
ESRI ArcView 3.3
Bentley PondPack (Haestad Methods) Version 9.0
Bentley Flow Master (Haestad Methods)
Bentley HEC-Pack
STABL5M
Hydrologic Evaluation of Landfill Performance (HELP)
Groundwater Vistas Version 3.5 (MODFLOW based 3D finite difference model, including MT3D, RT3D, MODPATH, MODFLOWT, and SWIFT Components
GMS (MODFLOW based 3D finite difference model, including MT3D, RT3D, MODPATH, and 3-D spatial analysis components)
Visual MODFLOW (MODFLOW based 3D finite difference model, including MODPATH)
SWANFLOW (3D finite difference model specializing in 3-phase fluid flow in porous media – water, NAPL, air)
Several analytical-based software packages including BIOCHLOR, BIOSCREEN, and SESOIL

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
TMDL Development for WV Group E2 Watershed (West Fork River Watershed)	WVDEP DWWM 601-57th Street Charleston, WV 25304-2345	Prime Contractor - TMDL Development Lead	N/A	30%
TMDL Development for WV Group D2 Watersheds (Monongahela River Watershed)	WVDEP DWWM 601-57th Street Charleston, WV 25304-2345	Prime Contractor - TMDL Development Lead	N/A	60%
PADEP Statewide Mining Engineering Design Services Contract, Pennsylvania	PADEP Bureau of Mining Programs 400 Market Street Harrisburg, PA 17105	Program management of five-year statewide mining engineering design contract	Not yet known	10%
PADEP Statewide Mining Engineering Design Services Contract, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	Program management of five-year statewide mining engineering design contract	Not yet known	10%
PADEP East Avoca-Grove Street Drainage Study, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	Management of mine drainage control project	Not yet known	0% (awarded in January 2013)
ODNR Statewide Coal Mining Permit Review Contract, Ohio	Ohio Dept. of Natural Resources 2045 Morse Road Columbus, OH 43229	Program management of two-year statewide coal mining permit reviews	N/A	45%
Wyoming Abandoned Mine Lands Statewide Subsidence Hazards Mitigation Contract, Wyoming	Wyoming Department of Environmental Quality, AML Division 122 W. 25th Street Cheyenne, WY 82002	Statewide program management of subsidence mitigation	Not yet known	20%

TOTAL NUMBER OF PROJECTS: 7 (Tetra Tech is currently conducting thousands of projects nationwide – for the purpose of this EOI, only a sample of our most recent mining projects for state entities are shown)	TOTAL ESTIMATED CONSTRUCTION COSTS: $0

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
N/A	N/A	N/A	N/A	N/A	N/A

Tetra Tech completed thousands of projects in the past five years. This is only a representative sample of that work.

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)
WVDEP Fisher Run (Posey) Mine Reclamation, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	$292,600	2010	Yes
WVDEP Paint Branch Abandoned Mine Land Project, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	$35,000	2010	Yes
WVDEP Tunnelton Mine Portal Closure Design, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	$62,300	2010	Yes
WVDEP TMDL Development for WV Group B2 Watersheds (Upper Kanawha, Elk River, and North Branch Potomac Watersheds)	WVDEP DWWM 601-57th Street Charleston, WV 25304-2346	N/A	2012	N/A
WVDEP TMDL Development for Cheat River Watershed, West Virginia	USEPA Region 3, 1650 Arch Street, Philadelphia, PA 19103; WVDEP DWWM, 601-57th Street, Charleston, WV 25304-2346	N/A	2011	N/A
WVDEP TMDL Development for WV Group C2 Watersheds (Middle Ohio North & South Watersheds)	WVDEP DWWM 601-57th Street Charleston, WV 25304-2345	N/A	2012	N/A
WVDOH Rita to Dabney Specialty Coal Appraisal, West Virginia	West Virginia Division of Highways 1900 Kanawha Blvd. East Charleston, WV 25305	N/A	2011	N/A
WVDHHR Drinking Water Treatment Revolving Fund, West Virginia	WVDHHR, Environmental Engineering Division, Infrastructure and Capacity Development 350 Capitol Street, Room 313 Charleston, WV 25301-3713	N/A	2012	N/A

Tetra Tech completed thousands of projects in the past five years. This is only a representative sample of that work.

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)
Consulting Services for Remining Operations, West Virginia	Dirtcon Excavating RR1 Box 30A Enterprise, WV 26568	N/A	2012	N/A
Marion County Reclaimed Mine Site Investigation, West Virginia	American Bituminous Power Partners, LP RR17 Grant Town, WV 26574	N/A	2012	N/A
Bandy and King Subsidence Project, Virginia	Department of Mines, Minerals & Energy 3405 Mountain Empire Road Big Stone Gap, VA 24219	N/A	2011	N/A
Western Pennsylvania Abandoned Mine Fire, Pennsylvania	Confidential Client	N/A	2011	N/A
Bear Run Acid Mine Drainage Passive Treatment System, Pennsylvania	Indiana County Conservation District in conjunction w/PADEP 1432 Route 286 Hwy. E Indiana, PA 15701	$250,000	2010	Yes
Gladden Mine Site Grading Plan and Acid Mine Drainage Treatment System, Pennsylvania	South Fayette Conservation Group in conjunction w/PADEP 515 Millers Run Road Morgan, PA 15064	$3,600,000	2009	Yes
Water Balance Study, Water Study, Ohio	Confidential Client	N/A	2010	N/A
Casselman Mine AMD Prevention and Response Plan, Maryland	Maryland Energy Resources, LLC 6015 Ferguson Road Indiana, PA 15701	N/A	2010	N/A

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)
ODOT Mine Subsidence Mitigation, Ohio	Ohio Department of Transportation 338 Muskingum Drive Marietta, OH 45750	N/A	2010	N/A
Marjol Battery Plant RFI Oversight and Mine Subsidence Investigation, Pennsylvania	EPA Region III 1650 Arch Street Philadelphia, PA 19103	N/A	2009	N/A
Majorsville Mine Subsidence Investigation, Pennsylvania	MarkWest Energy 601 Technology Drive, Suite 130 Canonsburg, PA 15317	N/A	2011	N/A
ALCOSAN Grand View Golf Course Mine Drainage Treatment System, Pennsylvania	ALCOSAN 3300 Preble Avenue Pittsburgh, PA 15233	N/A	2011	N/A
Coal Mine Air Shaft Closure Design, Ohio	Ohio Valley Coal Company 34 Kelley Way, Suite 100 Brilliant, OH 43913	N/A	2009	Yes
Ohio Valley Coal Company Mine Seal Closure Designs, Ohio	Ohio Valley Coal Company 34 Kelley Way, Suite 100 Brilliant, OH 43913	N/A	2008	Yes
Forest City Mine Water Sourcing Study, Pennsylvania	Confidential oil and gas client	N/A	2011	N/A
South Fayette Mine Water Sourcing Study, Pennsylvania	Confidential oil and gas client	N/A	2011	N/A

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)
Bird Mine and Strayer Mine Refuse Permitting and Water Treatment Design, Pennsylvania	AMD Industries, Inc. P.O. Box 501 California, PA 15419	N/A	2012	N/A
Kiskiminetas River Watershed Mining-Related Metals TMDL Development and Abandoned Mine Land GIS Services, Pennsylvania	PADEP and EPA Region 3 1650 Arch Street Philadelphia, PA 19103	N/A	2012	N/A
Mine Pool Water Evaluation Management Plan, Pennsylvania	Confidential oil and gas client	N/A	2011	N/A
Inspections for Settling Ponds under Mining Activity Permits, Pennsylvania	AMD Industries, Inc. P.O. Box 501 California, PA 15419	N/A	2010	N/A
Mine Reserves Investigation and Due Diligence Study, Pennsylvania	PBS Coals, Inc. 1576 Stoystown Road Friedens, PA 15541	N/A	2011	N/A
Quecreek Deep Mine Expansion Permitting, Pennsylvania	PBS Coals, Inc. 1576 Stoystown Road Friedens, PA 15541	N/A	2012	N/A
Coal Property Due Diligence Evaluation, Pennsylvania	Confidential client	N/A	2011	N/A
Report on Current Mine Rescue Practices in China, China	Center for Disease Control, NIOSH 1600 Clifton Road Atlanta, GA 30333	N/A	2008	N/A

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
Jonathan Run Acid Mine Drainage Treatment Plant Design, Pennsylvania	PennDOT 500 North Street Harrisburg, PA 17120	N/A	2012	N/A	GAI
Cresson Acid Mine Drainage Evaluation Project, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	N/A	2012	N/A	GAI
IHI Mine Fire Investigation, Colorado	Colorado Division of Mining Reclamation and Safety 101 South Third, Suite 301 Grand Junction, CO 81501	N/A	2010	N/A	Zapata Engineering, Inc.
Tetra Tech has been a subcontractor on numerous projects over the past five years. These are our most recent AML projects.					

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.

Due to the large number of mining projects recently completed by Tetra Tech, only a sample of some recent projects are shown in this attachment. Additional experience can be identified upon request.

20. The foregoing is a statement of facts.

Signature: Thomas A Gray Title: Unit Energy and Natural Resources Manager

Date: January 25, 2013

Printed Name: Thomas Gray, PE

Attachment C

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	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		Thomas Gray, PE	Mike Lutman, RPF	Terry Smith, PE	Joshua Whitney, PE	Ben Hoppe	Other Tetra Tech Personnel
TETRA TECH FEATURED PROJECTS																								
WVDEP Tunnelton Mine Portal Closure Design	C & P	E	X	X							X				X				M				P	P
WVDEP Fisher Run (Posey) Mine Portal Closure Design	C & P	E		X	X	X					X		X						M				P	P
WVDEP Paint Branch Mine Portals Design	C & P	E		X	X						X								P				P	M
WVDEP TMDL Development	C & P	E	X	X		X	X					X		X		X								M
Consulting Services for Dirtcon Remining Operations	C & P	E					X				X								P	M	P	P		P
Marion County Reclaimed Mine Site Investigation	C & P	E				X						X								P				M
PADEP Statewide Mining Design Contracts	C & P	E	X	X	X	X		X	X	X	X	X	X	X	X	X	X		M	P	P	P	P	P
Bandy and King Home Mine Subsidence Mitigation	C & P	E		X					X		X						X		M			P		P
PADEP Cresson Mine Pool Project	C & P	E				X					X	X		X					M		P	P	P	P
Bear Run Alkaline Mine Drainage Passive Treatment	C & P	E	X			X					X	X	X	X	X	X			M					P
PADEP East Avoca - Grove Street Mine Drainage Study	C & P	E	X			X						X		X					M		P	P		P
Gladden AMD Mitigation/Stream Sealing	C & P	E	X	X	X	X					X	X	X		X	X	X		M		P	P	P	P
Ohio Valley Coal Company Mine Seal Design	C & P	E			X														M		P	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.

*** List primary design personnel and their functional capacity for the projects listed.

Attachment "C"

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	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		Gregory Hynes, PE					
PROJECT MANAGER'S (GREGORY HYNES, PE) ADDITIONAL WVDEP EXPERIENCE																								
WVDEP Simpson Creek Highwall Tipple and Portals	P	D				X					X				X				M					
WVDEP Wymer Portals and Acid Mine Drainage	P	D	X		X	X					X	X		X	X	X	X		M					
WVDEP Davidson Highwall	P	D	X		X	X					X	X		X		X	X		M					
WVDEP Elkins Coal Refuse Reclamation	P	D				X					X						X		P					
WVDEP Tibbs Run Portals & Tipple Reclamation	P	D		X	X	X					X	X							P					
WVDEP National Mine Complex Reclamation	P	D									X						X		P					
WVDEP MacArthur Mine Subsidence	P	D		X		X			X		X						X		P					
WVDEP Beech Bottom Refuse Reclamation	P	D	X		X	X					X				X	X	X		P					
WVDEP Big Hollow Mine Dump Reclamation	P	D				X					X								P					
WVDEP Twilight Burning Refuse Reclamation	P	D						X			X								P					
WVDEP Piney Swamp Run Refuse No. 1 Reclamation	P	D				X					X	X		X					P					
WVDEP Turnhole Branch Reclamation	P	D			X	X					X						X		P					
WVDEP Pageton Mine Refuse Reclamation	P	D			X	X					X						X		P					

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Attachment "C"

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	Additional info provided in Section (s) **	PROJECT EXPERIENCE REQUIREMENTS																Primary staff participation/capacity *** M-Management P-Professional					
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PROJECT MANAGER'S (GREGORY HYNES, PE) ADDITIONAL WVDEP EXPERIENCE																								
WVDEP Masontown No. 4 Reclamation	P	D	X	X	X	X					X	X		X	X	X	X		P					
WVDEP Odd-Moore Mine Reclamation	P	D									X			X			X		P					
WVDEP Watson Portal and Refuse Reclamation	P	D	X	X	X	X					X	X		X	X	X	X		P					
WVDEP Point Marion Maintenance	P	D				X					X	X		X					P					
WVDEP Kempton Refuse and AMD	P	D	X		X						X	X		X		X	X		P					
WVDEP Borgman Refuse & Portals	P	D	X	X	X	X					X	X		X					P					
WVDEP Flemington Portals & Drainage No. 2	P	D	X	X	X	X					X			X			X		P					
WVDEP Maple Run Portals & AMD	P	D	X	X	X	X					X	X		X		X			P					
WVDEP Emoryville Mine Complex AML/AMD	P	D	X	X	X	X					X	X		X			X		P					
WVDEP County Route 9 Waterline Extension	P	D				X					X	X					X		P					
WVDEP 9 Conty Roads Water Supply Study	P	D				X						X							P					
WVDEP Cheat Lake Highwall	P	D			X	X					X								P					
WVDEP Recommendations to Ameliorate Subsidence	P	D							X								X		P					

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PROJECT	Exp. Basis C-Corp. P-Personal *	Additional info provided in Section (s) **	PROJECT EXPERIENCE REQUIREMENTS																Primary staff participation/capacity *** M-Management P-Professional					
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PROJECT MANAGER'S (GREGORY HYNES, PE) ADDITIONAL WVDEP EXPERIENCE																								
WVDEP Jed-Havaco Refuse Reclamation	P	D			X						X						X		P					
WVDEP Denver Street Drainage Abatement	P	D			X	X					X								P					
WVDEP Stonewood Reclamation	P	D			X	X					X						X		P					
WVDEP Stark Drainage Abatement	P	D				X					X								P					
WVDEP Beatty Church-Whetsell Road Highwall	P	D			X	X					X						X		P					
WVDEP National Church Hollow Road Waterline	P	D				X						X							P					
WVDEP McDowell County Water Supply System	P	D				X					X			X					P					
WVDEP Kanes Creek Water Line	P	D				X					X								P					
WVDEP Moundsville Water Line	P	D				X					X								P					
WVDEP Page-Kincaid Water Line	P	D				X					X								P					
WVDEP Dogtown Road Water Line	P	D				X					X								P					
WVDEP Turkey Run Water Line	P	D				X					X								P					
WVDEP Berwind, Canebrake, Vallscreek Study	P	D									X	X							P					

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PROJECT ADVISOR'S (THOMAS GRAY, PE) ADDITIONAL WVDEP EXPERIENCE																								
WVDEP Grout Injection Research Project	P	D							X		X		X						M					
WVDEP Water Supply Extension Project	P	D											X						P					
WVDEP Godby Branch Water Supply Extension	P	D	X								X	X					X		M					
WVDEP Gauley River Heizer/Manila Water Line	P	D											X						P					
WVDEP Lefthand Fork Burning Refuse	P	D	X				X	X			X	X					X		M					
WVDEP Owings Mine Grouting Design	P	D		X	X	X	X				X	X	X	X	X	X	X		M					
WVDEP Majesty Mine Complex Restoration	P	D	X	X	X	X	X				X	X		X	X	X	X		M					
WVDEP Refuse Pile and Mine Portal Reclamation Design	P	D	X								X						X		P					

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Attachment "C"

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	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		Thomas Gray, PE	Mike Lutman, RPF	Terry Smith, PE	Joshua Whitney, PE	Ben Hoppe	Other Tetra Tech Personnel
TETRA TECH'S ADDITIONAL WVDEP AND WEST VIRGINIA STATE AGENCY EXPERIENCE																								
WVDEP DWWM TMDL Development E2 Watersheds	C & P					X						X												M
WVDEP DWWM TMDL Development D2 Watersheds	C & P					X						X												M
WVDEP TMDL Development Group B2 Watersheds	C & P					X						X												M
WVDEP TMDL Development Cheat River Watershed	C & P					X						X												M
WVDEP TMDL Development Group C2 Watersheds	C & P					X						X												M
WVDOH Rita to Dabney Specialty Coal Appraisal	C & P																		M		P	P		P
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Attachment "C"

AML and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	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		Thomas Gray, PE	Mike Lutman, RPF	Terry Smith, PE	Joshua Whitney, PE	Ben Hoppe	Other Tetra Tech Personnel
TETRA TECH'S ADDITIONAL RECENT LOCAL EXPERIENCE																								
Eastern Ohio Coal Mine Air Shaft Closure Design	C & P				X	X													M					P
Ohio DNR Mine Permit Review Contract	C & P		X																P	P	P	P	P	M
Jonathan Run AMD Treatment Design	C & P					X					X			X					M					P
Quecreek Deep Mine Expansion	C & P					X			X			X		X			X		M		P	P		P
Forest City Mine Water Sourcing Study	C & P		X			X						X		X					M		P	P		P
South Fayette Mine Water Sourcing Study	C & P		X			X			X			X		X					M		P	P		P
Mine Pool Water Evaluation Management Plan	C & P		X			X						X		X			X		M		P	P		P
ODOT Highway 33 Subsidence Mitigation	C & P			X					X								X		P					M
Majorsville Pipeline Alignment Subsidence Study	C & P								X								X		P					P
Marjol Plant RFI and Mine Subsidence Evaluation	C & P			X		X			X				X				X		P					P
Powderly Creek Mine Drainage Feasibility Study	C					X					X	X		X		X	X							M
ALCOSAN AMD Treatment System and Pipeline	C & P					X						X		X					M					P
Casselman AMD Prevention and Response Plan	C & P						X					X		X					M			P		P

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Attachment "C"

OSR and RELATED PROJECT EXPERIENCE MATRIX

PROJECT	Exp. Basis C-Corp. P-Personal *	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		Thomas Gray, PE	Mike Lutman, RPF	Terry Smith, PE	Joshua Whitney, PE	Ben Hoppe	Other Tetra Tech Personnel
TETRA TECH'S ADDITIONAL RECENT LOCAL EXPERIENCE																								
Bird Mine & Strayer Refuse Permitting/Treatment Design	C & P					X		X				X		X					M	P	P	P		P
PA Abandoned Mine Fire Remediation/Investigation	C & P		X		X	X		X	X			X	X	X					M			P		P
Beaver County YMCA Subsurface Investigation	C					X						X					X							P
Kiskiminetas TMDL/AML GIS Support	C & P					X						X		X		X								M
Settling Pond Inspections under Mining Activity Permits	C & P					X											X		M					P
PBS Coals Mine Reserves Investigation	C & P										X								M			P		P
MEPCO Mine Discharge Water Treatment Evaluation	C & P					X					X	X		X					M					P
Casselman Mine Biomonitoring Plan	C & P					X						X							M		P	P		P
Belmont Mine Water Balance Studies	C & P					X						X							M			P		P
PA Coal Property Due Diligence Evaluation	C & P																		M		P	P		P
Boone County Rural Water Line Expansion	C & P					X					X		X											M
Canterbury Coal Floating Pump Station Design	C & P					X								X					M					P
NEPCO CoGen Plant Fuel Supply and Ash Disposal	C & P									X		X							M					P

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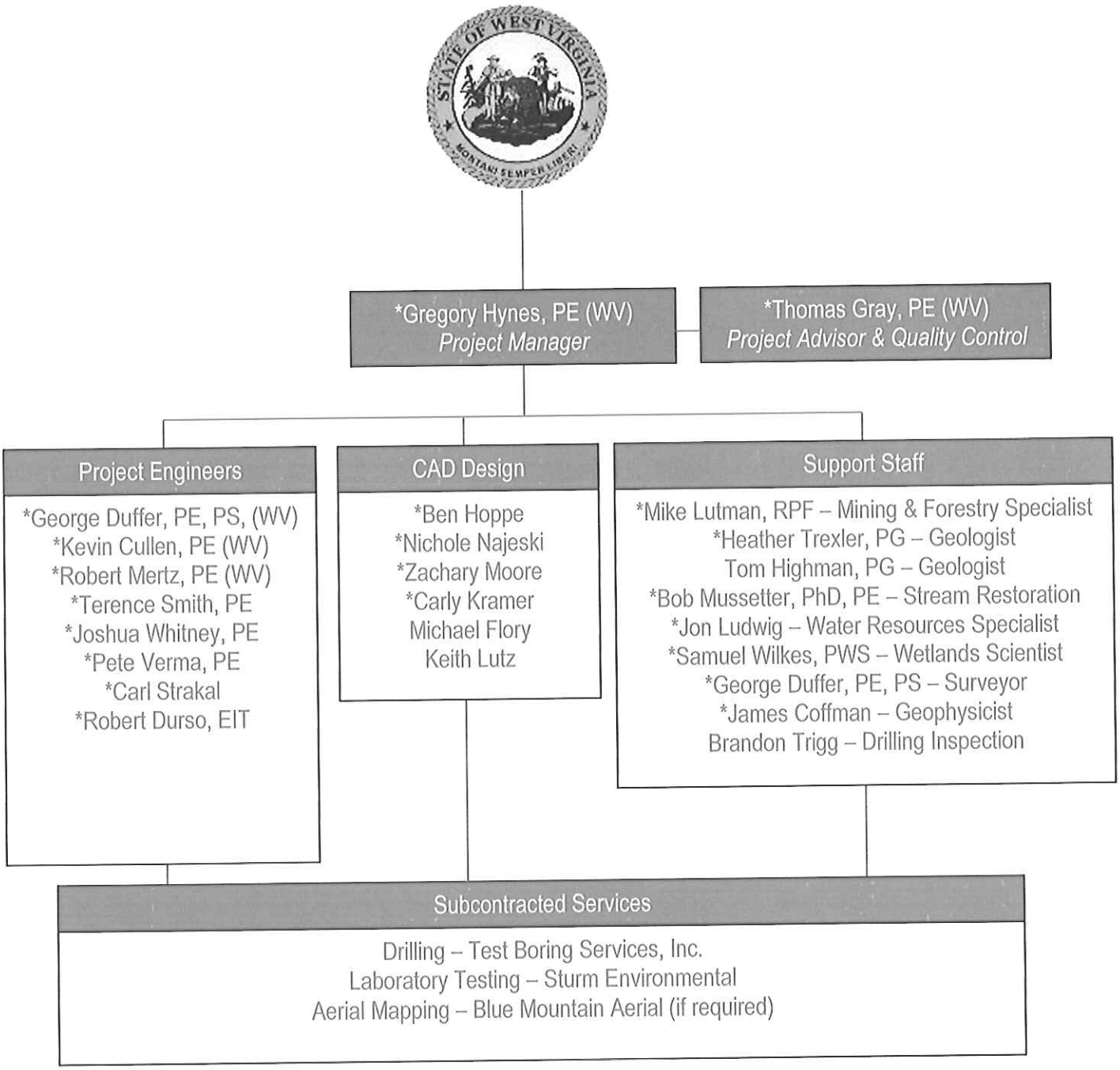
Personnel

ORGANIZATION CHART



* indicates resume included in this section

GREGORY HYNES, PE

Project Manager

EDUCATION
MS, Civil Engineering BE, Civil Engineering
REGISTRATIONS
Professional Engineer: WV, PA, OH
YEARS EXPERIENCE
26

Mr. Hynes has more than 26 years of experience in abandoned mine land reclamation, land restoration, mining permits, and environmental and water resources engineering. He has managed or supported more than 25 AML projects for the WVDEP. Most recently, Mr. Hynes managed three highwall projects for the agency in 2012 – the Waitman-Barbe Highwall, the Colliers Sportsman's Club Highwall, and the Simpson Creek Highwall. He has also managed several projects for other state agencies including PADEP and the Ohio Department of Natural Resources, preparing design calculations, cost estimates, plans, and technical specifications for abandoned mine land reclamation. Mr. Hynes has also prepared permit applications and construction level drawings and specifications for proposed surface mine facilities in West Virginia and Pennsylvania. Projects included permitting and reclamation of various mining related surface facilities.

Project Manager; Simpson Creek Highwall, Tipple, and Portals; WVDEP; Barbour County, WV. Responsible for project management, engineering design, and development of construction plans, specifications, and cost estimates. The project included exploratory drilling, and preparation of reclamation plans and specifications for five sites containing numerous suspected mine entries to a large underground mine complex. Design measures included elimination of impounded mine water, installation of wet mine seals, access roads, collection channels, tipple demolition, minor site grading to provide positive drainage, and final revegetation.

Project Manager; Wymer Portals and Acid Mine Drainage; WVDEP; Monongalia County, WV. Responsible for project management, engineering design, and development of construction plans, specifications, and cost estimates. The project included development of site mapping, exploratory drilling, and preparation of reclamation plans and specifications for a large abandoned mine complex. Design measures included elimination of impounded mine water, installation of wet mine seals, bat gates, and access roads, elimination of highwalls by proposed earthwork and site grading with available on site refuse and spoil materials, and final revegetation. Numerous surface water and mine drainage structures including ditches, pipes, and underdrains were also required.

Project Manager; Davidson Highwall; WVDEP; Monongalia County, WV. Responsible for project management, engineering design, and development of construction plans, specifications, and cost estimates. The project included development of site mapping, exploratory drilling, and preparation of reclamation plans and specifications for a large abandoned mine complex. Design measures included elimination of impounded mine water, installation of wet mine seals, stream channel restoration, elimination of highwalls by proposed earthwork and site grading with available on site refuse and spoil materials, and final revegetation. Numerous surface water and mine drainage structures including ditches, pipes, and underdrains were also required.

Project Engineer; Elkins Coal Refuse Reclamation; WVDEP; Preston County, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans and specifications for the project which included erosion and sedimentation control measures, site earthwork and grading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Tibbs Run Portals & Tipple Reclamation; WVDEP; Monongalia County, WV. Performed research of geological data and mining maps, review of water quality data, and design of reclamation measures, including mine seals, underdrains, and mine water collection channels. Prepared construction plans, specifications, and cost estimates for the project, which included erosion and sedimentation control measures, site regrading, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; National Mine Complex Reclamation, WVDEP; Monongalia County, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans and specifications for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; MacArthur Mine Subsidence; WVDEP; Raleigh County, WV. Performed drilling inspection, mine map research and interpretation, and parking lot and roadway restoration, and developing specifications, plans, and cost estimates. The project required test drilling in a residential neighborhood in order to estimate grouting requirements to abate its underground mine subsidence problems.

Project Engineer; Beech Bottom Refuse Reclamation Project; WVDEP; Ohio and Brooke Counties, Beech Bottom, WV. Responsibilities included site design and preparation of the project construction plans and specifications. The project included three sites located along the Ohio River containing barren refuse piles ranging in size from 15 to 60 acres. The reclamation plan developed by Baker provided for the refuse piles to be graded to stable slopes, covered, and vegetated to reduce AMD generation. Refuse piles encroaching on the Ohio River were graded and covered with a mat liner and vegetated for erosion control. Site drainage with collection ditches and storm water piping was also designed to provide positive drainage. A phase I archaeological investigation of a proposed borrow area located in the Ohio River Floodplain was performed as required by the WV SHPO.

Project Engineer; Big Hollow Mine Dump Reclamation; WVDEP; Mullins, WV. Performed research of geological data and mining maps. Prepared construction plans and specifications for the project which included erosion and sedimentation control measures, site regrading, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Twilight Burning Refuse Reclamation; WVDEP; Twilight, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and grading, mine seals, methods of extinguishing/quenching actively burning refuse, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Piney Swamp Run Refuse No. 1 Reclamation Project; WVDEP; Keyser, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including anaerobic/compost wetlands, successive alkalinity producing systems, anoxic limestone drains, metals settling ponds, and open limestone channels. Prepared construction plans, specifications, and cost estimates for the project, which included erosion and sedimentation control measures, site regrading, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Turnhole Branch Reclamation Project; WVDEP; McDowell County, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, underdrain, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Pageton Mine Refuse Reclamation; WVDEP; Pageton, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans and specifications for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation

Project Engineer; Masontown No. 4 Reclamation, AMD Abatement; WVDEP; Masontown, WV. Performed research of geological data and mining maps, review of water quality data, and preparation of construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and grading, mine seals (wet and dry), collection and diversion ditches, stream crossings, soil cover placement, and revegetation. The Masontown No. 4 project required the design of measures for the abatement of acid mine drainage (AMD) emanating from abandoned mine entries and refuse piles at four specific sites along two tributaries to the Cheat River.

Project Engineer; Odd-Moore Mine Reclamation; WVDEP; Raleigh County, Odd, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, underdrains, limestone ditches, abandoned mining structure removal, soil cover placement, and revegetation. The Odd Moore Refuse Pile abandoned mine land site consisted of two refuse piles covering approximately 12 acres with steep unstable slopes, four abandoned mining impoundments, a concrete foundation and remains of an old tipple, and acid mine drainage (AMD) seepage, all in close proximity to an existing residence.

Project Engineer; Watson Portal and Refuse Reclamation; WVDEP; Fairmont, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including anoxic limestone drains, metals settling ponds, and open limestone channels. Prepared construction plans and specifications for the project, which included erosion and sedimentation control measures, site regrading, mine seals, collection and diversion ditches,

abandoned barge and coal refuse removal from the North Branch of the Monongahela River, soil cover placement, and revegetation.

Project Engineer; Point Marion Maintenance; WVDEP; Monongalia County, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including aerobic wetlands, successive alkalinity producing systems, metals settling ponds, open limestone channels, and fly ash soil amendments. Prepared plans and detailed cost estimates for the project, which included site regrading, mine seals, collection and diversion ditches, soil cover placement, and revegetation. The project involved the maintenance and rehabilitation of an AML site originally reclaimed by others in the 1970's. The existing site included four mine seals, a geotextile lined collection channel, a concrete energy dissipater basin and riprap spillway overflow. The site area was along a steep hillside above Cheat Lake. Acid mine drainage was observed emanating at several locations below the collection channel indicating that seepage was not being intercepted as intended in the original design. The channel itself was in need of repair as evidenced by ponded water, erosion, and exposed sections of the existing geotextile lining.

Project Engineer; Cheat Lake Highwall; WVDEP; Monongalia County, WV. Performed research of geological data and mining maps and review of water quality data. Prepared construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, mine seals (wet and dry), collection and diversion ditches, stream crossings, soil cover placement, and revegetation. The Cheat Lake Highwall abandoned mine land site consisted of a 19-acre refuse pile, numerous abandoned mine openings discharging acid mine drainage (AMD), and a dangerous highwall in close proximity to a residential area.

Project Engineer; Emoryville Mine Complex Reclamation and AMD Remediation; WVDEP; Emoryville, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including open limestone channels, Successive Alkalinity Producing Systems, and aerobic wetlands. Prepared construction plans and specifications for the project which included erosion and sedimentation control measures, site regrading, mine seals, collection and diversion ditches, abandoned barge and coal refuse removal from the North Branch of the Monongahela River, soil cover placement, and revegetation. The Emoryville Mine Complex project required the design of measures for the abatement of acid mine drainage (AMD) emanating from abandoned mine entries and piles at three sites. AMD discharges and coal refuse piles are located along both sides of Emory Creek, a tributary to the North Branch Potomac River.

Project Engineer; Flemington Portals and Drainage; WVDEP; Taylor County, WV. Provided review and oversight of all hydraulic and hydrologic calculating performed on the project, and developing conceptual plans for review with the client prior to finalization of the design. The design portion of the project included the following: design of reclamation measures for an abandoned highwall area, construction of diversion and collection ditches, replacement of an existing culvert, repair to existing mine seals and ditches, erosion and sedimentation control measures, and site grading to eliminate the existing ponded areas, and revegetation. The work also included preparation of construction plans and specifications including the cost estimate.

Project Engineer; Mine Reclamation for Borgman Refuse and Portals; WVDEP; Preston County, WV. Performed research of geological data and mining maps, designing reclamation measures, and preparing construction plans and specifications for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation. Baker's responsibilities included site reconnaissance, survey and mapping, subsurface investigation, designing grading, drainage control structures, ditches, passive treatment for AMD, earthwork, and preparation of plans, specifications and costs.

Project Engineer; Kayford Mountain – Recommendations to Ameliorate Subsidence; WVDEP; WV. Provided field reconnaissance of a subsidence crack associated with mine subsidence. A four-foot wide, 400-foot-long subsidence crack appeared on the side of Kayford Mountain in a location that would be mountaintop-mined. Baker investigated the causes of the "mountain crack", determined the stability of the rock mass, and prescribed any remediation needed to prevent down slope damage due to falling masses.

Project Engineer; Kempton Refuse and Acid Mine Drainage; WVDEP; Tucker County, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including open limestone channels, SAPS cells, and aerobic wetlands. Prepared construction plans and specifications for the project, which included site grading, mine seals, collection and diversion ditches, soil cover placement, and revegetation. Work performed by Baker for the WVDEP under this contract on the Kempton Refuse and AMD project included performance of site reconnaissance and office research, field surveying, test drilling, analysis and design of reclamation measures, preparation of construction plans and specifications, and development of a quantity estimate and construction cost estimate.

Project Engineer; Jed-Havaco Refuse Reclamation; WVDEP; WV. Performed research of geological data and mining maps, designed reclamation measures, and prepared construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Denver Street Drainage Abatement; WVDEP; WV. Performed research of geological data and mining maps, designed reclamation measures, and prepared construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, mine seals, pond for active treatment of mine water during dewatering of mine pool, water conveyance pipe, collection ditches, and diversion ditches.

Project Engineer; Stonewood Reclamation; WVDEP; WV. Performed research of geological data and mining maps, designed reclamation measures, and prepared construction plans, specifications, and cost estimates for the project which included erosion and sedimentation control measures, site earthwork and regrading, slope stability analysis, mine seals, collection and diversion ditches, soil cover placement, and revegetation.

Project Engineer; Stark Drainage Abatement; WVDEP; WV. Performed research of geological data and mining maps, designed reclamation measures, and prepared construction plans, specifications, and cost

estimates. The project included erosion and sedimentation control measures, mine water conveyance pipe in underdrains and horizontally bored into mine workings, a manhole and inlet with West Virginia Department of Transportation, Division of Highways' roadway crossing, placement and piping collection and diversion ditches, and underdrains.

Project Engineer; Beatty Church-Whetsell Road Highwall No. 2; WVDEP; WV. Performed site grading; determined earthwork requirements; performed drainage design, mine seal and underdrain design, and drilling inspection; and prepared plans, specifications, and cost estimates. The site required regrading of material to a stable slope against the existing highwall.

Project Engineer; National Church Hollow Road Water Line Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities and AMD on groundwater within the study area, and evaluated existing water distribution systems. Project included field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and preparing a detailed written report including preliminary construction cost estimates for recommended water supply alternatives. The National Church Hollow Road Waterline Extension Feasibility Study was completed for the West Virginia Division of Environmental Protection (WVDEP) and included detailed research of the local hydrology, hydrogeology, geology, and past mining activities, as well as collection and analysis of representative water samples and interviewing residents. Conclusions regarding the impact of that past mining activities have had upon local hydrogeology conditions as well as on water quality and quantity were formulated based upon information collected as part of the investigation. Finally, the report presented recommendations regarding remedial actions including extension of the National Church Hollow Road water distribution system and upgrades to the existing treatment facility.

Project Engineer; McDowell County Public Water Supply System; WVDEP; WV. Performed distribution system hydraulic analysis and pipeline design, storage tank sizing, drilling inspection, well pump design, and booster station design, and assisted in preparing plans, specifications, and cost estimates. The project included complete design of a new water treatment plant, two water storage tanks and foundations, and distribution system consisting of 29 miles of pipe to serve over 900 proposed residential users at an estimated cost of $5,300,000.

Project Engineer; County Routes Water Line Extensions; WVDEP; WV. Performed distribution system hydraulic analysis and pump station design, renovation of an existing pump station, and preparation of plans, specifications, and cost estimates. The project included installation of over 90,000 feet of PVC and Ductile Iron pipe to serve 170 residential and commercial connections.

Project Engineer; Kanes Creek Water Line; WVDEP; WV. Performed water distribution system hydraulic analysis and pipeline design, and pump selection, and prepared plans, specifications, and cost estimates. The project included installation of 6,000 feet of 6-inch PVC pipe, and 2,000 feet of 2-inch PVC pipe to serve 26 residential connections.

Project Engineer; Moundsville Water Line; WVDEP; WV. Provided pipeline layout, and prepared plans, specifications, and cost estimates. The project included replacement of 6,000 feet of 10-inch PVC

transmission line, and replacement of deteriorated pipelines at several locations within the distribution system.

Project Engineer; Page-Kincaid Water Line; WVDEP; WV. Performed water distribution system hydraulic analysis and pipeline design, storage tank sizing, and drilling inspection, and prepared plans, specifications, and cost estimates. The project included installation of over 73,000 feet of 6-, 4- and 2-inch PVC and Ductile Iron pipe, three water storage tanks, two booster stations, and modifications to an existing booster station to serve 100 new residential connections.

Project Engineer; Dogtown Road Water Line; WVDEP; WV. Performed water distribution system hydraulic analysis and pipeline design, storage tank sizing, and drilling inspection, and assisted in preparing plans, specifications, and cost estimates. The project included installation of 25,000 feet of 6-inch PVC, 4,400 feet of 2' PVC, and a 195,000-gallon storage tank to serve 70 new residential connections.

Project Engineer; Turkey Run Water Line; WVDEP; WV. Performed water distribution system hydraulic analysis and pipeline design, and assisted in preparing plans, specifications, and cost estimates. The project included installation of 15,300 feet of 8-inch PVC, 4,700 feet of 4-inch PVC, and 6,500 feet of 2-inch PVC pipe to serve 31 new residential connections.

Project Engineer; Berwind, Canebrake and Vallscreek Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities on groundwater within the study area, and evaluated existing water distribution systems. Project included performing field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and providing preliminary construction cost estimates for recommended alternatives.

Project Engineer; Cucumber, Newhall, Squire, Johnstown, and Jacob's Fork Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities on groundwater within the study area, and evaluated existing water distribution systems. Project included performing field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and providing preliminary construction cost estimates for recommended alternatives.

Project Engineer; Kane's Creek Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities on groundwater within the study area, and evaluated existing water distribution systems. Project included performing field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and providing preliminary construction cost estimates for recommended alternatives.

Project Engineer; County Routes Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities on groundwater within the study area, and evaluated existing water distribution systems. Project included performing field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible

solutions to water quality problems, and providing preliminary construction cost estimates for recommended alternatives.

Project Engineer; Miller Mountain Water Line Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities and AMD on groundwater within the study area, and evaluated existing water distribution systems. Project included field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and preparing a detailed written report including preliminary construction cost estimates for recommended water supply alternatives

Project Engineer; Terra Alta Water Supply Feasibility Study; WVDEP; Terra Alta, WV. The Town of Terra Alta Waterline Extension Feasibility Study was completed for the West Virginia Division of Environmental Protection (WVDEP) and included detailed research of the local hydrology, hydrogeology, geology, and past mining activities, as well as collection and analysis of representative water samples and interviewing residents.

Project Engineer; Turkey Run Water Line; WVDEP; WV. Performed water distribution system hydraulic analysis and pipeline design, and assisted in preparing plans, specifications, and cost estimates. The project included installation of 15,300 feet of 8-inch PVC, 4,700 feet of 4-inch PVC, and 6,500 feet of 2-inch PVC pipe to serve 31 new residential connections.

Project Engineer; County Routes Feasibility Study; WVDEP; WV. Performed research of geological data and mining maps, evaluated impacts of past mining activities on groundwater within the study area, and evaluated existing water distribution systems. Project included performing field research and sampling of surface and groundwater, plotting laboratory test results on Piper Trilinear Diagrams, identifying possible solutions to water quality problems, and providing preliminary construct cost estimates for recommended alternatives.

Project Engineer; Ely & Puckett Creek AMD Feasibility; USACE Nashville District; Lee County; VA. Performed research of geological data and mining maps, review of water quality data, and feasibility level design of acid mine drainage abatement measures, including equalization ponds, open limestone channels, Successive Alkalinity Producing Systems, and aerobic wetlands. Prepared construction plans and specifications for the project which included erosion and sedimentation control measures, site regrading, mine seals, collection and diversion ditches, earthwork, soil cover placement, and revegetation. Baker was responsible to asses characteristics related to the site, acid mine drainage (AMD), watersheds and the groundwater hydrology. The purpose was to develop a technically and economically feasible passive treatment system to the AMD discharges in order to restore the Ely and Puckett Creeks ecosystems. Firm prepared the feasibility report that presented conceptual designs and preliminary cost estimates.

Project Engineer; Cadiz Streets II Stabilization - Abandoned Mine Lands; Ohio Department of Natural Resources (ODNR); Harrison County, Cadiz, OH. Assisted in the preparation of grout stabilization plans to address subsidence due to pre-law mining beneath a residential neighborhood. Also, prepared specifications and cost estimates for the project.

Project Manager; Mineral City Park Acid Mine Drainage Remediation Study; ODNR; Tuscarawas County, Mineral City, OH. Responsibilities included field reconnaissance to identify acid mine drainage (AMD) sources within a 730 acre watershed impacting an unnamed tributary to Project required documentation of findings including conceptual abatement design alternatives, prediction of improvements to stream quality, ranking of sites based on environmental impacts, design of stream restoration, and preparation of the feasibility report.

Project Engineer; Dennison/State Route 800 Mine Drainage Project; ODNR; Dennison, Tuscarawas County, OH. Reviewed geological data, mining maps, and water quality data, and providing design of mine drainage abatement measures, including a metals precipitation pond and aerobic wetland. Provided environmental assessment documentation, and design of storm sewers for surface water, and conveyance pipes for mine water.

Project Engineer; Barberton & Mount Eaton Subsidence Risk Evaluation; ODNR; Barberton and, Mount Eaton, OH. Provided site reconnaissance and field location of proposed exploratory boreholes. A residential area within the City of Barberton, Summit County, Ohio is known to be undermined by unmapped workings in the Sharon #1 Coal Seam.

Project Engineer; Vienna Mine Shafts – Abandoned Mine Lands; ODNR; Vienna, OH. Provided plans, specifications, and cost estimates for sealing two 100-foot-deep mine shafts located at two different sites and determine the best design for sealing the shafts. Both sites are on wooded lots adjacent to occupied residences.

Project Manager; Lindentree AMD Remediation Project; ODNR; Carroll County, Lindentree, OH. Responsibilities included performance of hydrologic and hydraulic analysis for culvert and collection ditch design, preparation of grading layout, design of a passive acid mine drainage treatment wetland, restoration of an existing stream channel, and preparation of the project plans and specifications.

Project Engineer; North Branch Potomac River AMD Abatement; USACE Baltimore District; Garrett County, MD and Grant and Mineral Counties, WV. Performed research of geological data and mining maps, review of water quality data, and design of acid mine drainage abatement measures, including aerobic wetlands, anaerobic/compost wetlands, successive alkalinity producing systems, anoxic limestone drains, metals settling ponds, open limestone channels, and fly ash soil amendments. Prepared plans and detailed cost estimates for the project, which included site regrading, mine seals, collection and diversion ditches, soil cover placement, and revegetation. A reconnaissance study by the U.S. Army Corps of Engineers, Baltimore District determined that mine drainage from a particular watershed area was primarily responsible for the degradation to aquatic habitat of the Upper North Branch Potomac River.

THOMAS GRAY, PE

Project Advisor / Quality Control

EDUCATION
BS, Mining Engineering MBA
REGISTRATIONS
Professional Engineer: WV, PA, OH, MD, VA
YEARS EXPERIENCE
39

Mr. Gray has more than 39 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.

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 Engineer; Paint Branch Mine Portals; WVDEP; Paint Branch, WV. The West Virginia Department of Environmental Protection (WVDEP) Office of Abandoned Mine Lands retained Tetra Tech to develop a reclamation design of an abandoned underground mining site in Paint Branch, WV in 2010. The site consisted of three open mine portals and approximately 42 abandoned bridge piers. Topographic mapping of the site was prepared and used by Tetra Tech to develop a design including construction drawings, specifications, and a construction cost estimate. An erosion and sedimentation control plan was also completed. Tetra Tech also provided construction support.

Project Consultant; Owings Mine Complex Site Reclamation Acid Mine Drainage Treatment System Design & Evaluation; 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.***

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 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 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; OSM Little River Highwall and 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.

Project/Contract Manager; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Recently awarded this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project/Contract Manager; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Recently awarded this five-year, $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Project/Contract Manager; 2007 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Managed this open-end contract while at GAI 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; 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.

Project Manager: Bear Run Acid Mine Drainage 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 Treatment Design & Evaluation; 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 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.

Senior Project Manager; Open-End Contract; Maryland Department of the Environment Bureau of Mines; Frostburg, MD. Managed an open-end contract (completing 16 projects) to provide technical assistance in mine engineering, acid mine drainage treatment and mine reclamation.

Project Manager; Surface Mining Act; Maryland Department of the Environment Bureau of Mines; Frostburg, MD. Investigated and provided expert opinions of the impacts on two domestic water supply sources from surface mining in Raynor and Kinsinger, MD. Reported on the impacts of surface coal mining activities on the quality and quantity of local groundwater supplies in the vicinity of Mill Run, MD. Reviewed the groundwater hydrology section of a surface coal mine permit application during agency review.

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.

Project Manager; Galbraith Landslide Abatement/Geotechnical Investigation; Office of Surface 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.

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.

Project Manager; Coal Refuse Pile Reclamation; Maple Coal Company; Colver, PA. Prepared technical specifications for reducing the potential for spontaneous heating at the Colver coal refuse pile.

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 completed 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.

Project Manager; Streyer Run Mine Subsidence Impacts Assessment; Maryland Department of the Environment Bureau of Mines; Garrett County, MD. Assessed potential mine subsidence impacts on Streyer Run from proposed underground mining.

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; 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.

Project Manager; Mine Seal Evaluation; Duquesne Light Company; Greensboro, PA. Evaluated suitability of a mine seal at the Gray's Landing Lock and Dam being constructed on the Monongahela River by the USACE.

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.

Project Manager; Casselman Mine Acid Mine Drainage Prevention and Response Plan; Maryland Energy Resources; Garrett County, MD. Prepared a plan for submittal to the state of Maryland which outlined the measures to be taken to prevent impacts to the Casselman River by mine water when an underground coal mine was closed. The plan needed to include provisions that explained the interaction of the final mine pool with the Casselman River, what measures would be taken to avoid seeps, outflows, and other discharges resulting from the mine pool, how the mine pool would be controlled post-mining, a monitoring and detection plan for acid mine drainage seeps, and a response/mitigation plan should a seep or discharge occur.

Project Manager; Kempton Mine Acid Mine Drainage Study; Mettiki Coal Company; Western MD. Completed a mine drainage study to determine the feasibility of eliminating AMD flowing from the abandoned Kempton mine into the headwaters of the Potomac River by siphoning water from the pool into an adjacent active underground mine. The study evaluated the potential for lowering the mine pool to below the level of the discharge by siphoning water from the pool into Mettiki's active underground mine.

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.

"Mr. Gray has provided the WVDEP with the highest quality of services and I recommend him to all agencies that are considering using the services of Tetra Tech."

David Broschart
West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands

MIKEL LUTMAN, RPF

Mining Specialist

EDUCATION
MS, Forest Hydrology BS, Forest Resources Management
REGISTRATIONS
Registered Professional Forester
YEARS EXPERIENCE
34

Mr. Lutman has more than 34 years of experience in support of coal, mining, and civil engineering projects. He has more than 20 years of abandoned mine land related design experience and has completed a variety of mining projects throughout his career including mine fires, refuse removal/stabilization, coal reserve evaluations, permitting, development of mine plans, hydrological studies, acid mine drainage treatment plans, involvement with start-up operations and daily mining activities, and managing drilling/exploratory options.

Mining Specialist; Mine Fire Plan; Maryland Bureau of Mines; Garrett County, MD. Assisted with the development of a plan to determine extent and condition of a coal seam mine fire located near Lonaconing, MD. A follow up plan was later developed.

Project Manager; Acid Mine Drainage (AMD) Treatment Abatement; Friends of Cheat; Preston County, WV. Scope of services for these projects included devising various passive treatment systems that were matched to the existing site conditions. Steel slag leach bed units were also incorporated into several of the projects to supply additional alkalinity for extended treatment.

Project Manager; Mine Development Activities; Shafer Brothers Construction; Monongalia County, WV. Services consisted of procurement of reserves, drilling activities and evaluation of results, mine planning and environmental permitting for stream/wetland resources, mitigation and restoration planning.

Project Manager; Mine Evaluation Study; Summit at Cheat Lake; Monongalia County, WV. Initial duties for this 120-acre housing development involved conducting a mine evaluation study to determine the extents and conditions of previously deep and surface mined areas within the project area. A follow up grouting and stabilization program was devised for the various sections of the development property.

Project Manager; Mine Evaluation Study; Grove Park Place; Monongalia County, WV. Mine evaluation study for this mixed-use complex to determine the extent and conditions of previously deep mined areas. A follow-up grouting and stabilization program was devised for the subject property tract.

Mining Specialist; Everettville Refuse Reclamation; WVDEP AML Division; Monongalia County, WV. Assisted with developing plans and specifications for the reclamation of an abandoned refuse pile and impoundment. Plans included impoundment and refuse stabilization, mine seal units, drainage control and a revegetation plan. The community of Everettville was nearby, which posed a level of concern for safety.

Project Manager; Removal/Stabilization of Coal Refuse; American Bituminous Power Partners; Marion County, WV. Assisted with the removal and stabilization of coal refuse materials from various abandoned disposal sites as a result of previous mining activities. Also developed plans for several AMD collection/treatment systems and related DEP permits.

TERRY SMITH, PE

Mining Engineer

EDUCATION
BS, Mining Engineering
REGISTRATIONS
Professional Engineer: PA
YEARS EXPERIENCE
34

Mr. Smith has more than 34 years of experience in mining engineering and management, and water and wastewater design engineering and project management. Experience includes longwall mining, coal preparation plant and coal refuse disposal supervision, surface mine permitting, mine operations evaluations, compliance evaluations, economic feasibility analysis, cost estimating and project management in the coal mining industry.

Project Manager; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a project manager for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project Manager; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a project manager for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Project Engineer; AMD Treatment; PADEP; Cresson, PA. 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.

Coal Preparation Plant Supervisor: Martinka Mine Supervision; Southern Ohio Coal Company; Fairmont, WV. Supervised operating and maintenance personnel at a coal processing plant and a refuse disposal landfill at a 2.5 - 3 million ton/year coal mine. Implemented a management information system at coal preparation facilities and oversaw data entry and reporting.

Longwall Maintenance Supervisor; Martinka Mine Supervision; Martinka Mine; Fairmont, WV. Supervised union employees in preventive maintenance and repair of mining equipment for a one-million ton per year longwall unit. Duties included directing workers, assigning work orders for maintenance repairs, implementing safety plans, and completing management reports.

Engineer; Mine Feasibility & Operating Method Studies; AEP; Lancaster, OH. Performed cost feasibility and operations method studies. Evaluated mining procedures and equipment at surface and underground coal mining operations. Implemented preventive maintenance procedures, monitored safety plans, and prepared mine permit applications for surface and underground operations.

KEVIN CULLEN, PE

Civil and Environmental Engineer

Mr. Cullen is a project manager and civil engineering working in Tetra Tech's Fairmont, West Virginia office. He is a registered Professional Engineer in West Virginia and has been responsible for environmental compliance through the WVDEP and EPA for a number of projects. In addition, Mr. Cullen has served as a supervisor on several road construction, engineering, and environmental control for projects while working for the West Virginia Division of Highways. On these projects, he has worked with local and WVDEP representatives to ensure the proper sediment and erosion control was in place such as seeding, ditch checks, and sediment ponds. Mr. Cullen has also been responsible for controlling run-off and discharge on projects.

EDUCATION
BS, Civil/Environmental Engineering
REGISTRATIONS
Professional Engineer: WV, VA
YEARS EXPERIENCE
11

Project Engineer/Supervisor; Various Roadway and Bridge Projects (with WVDEP coordination); West Virginia Division of Highways; WV. While employed with the West Virginia Division of Highways, Mr. Cullen served as a supervisor on various road and bridge projects totaling approximate $19 million, providing engineering and environmental control support. Mr. Cullen worked hand in hand with local and WVDEP representatives to ensure the proper sediment and erosion control was in place such as seeding, ditch checks, and sediment ponds. Mr. Cullen worked with the contractors on projects and oversaw their activities to ensure WVDOT specifications were met.

Project Engineer; Fort Martin, Albright, and Rivesville Power Stations with coordination with the WVDEP; Allegheny Energy; Maidsville, WV. Mr. Cullen served as a regional engineer over Fort Martin, Albright, and Rivesville Power Stations for Allegheny Energy. He oversaw and was responsible for all environmental compliance with the WVDEP and the EPA, as well as civil engineering and controls for each station. Mr. Cullen coordinated various projects at the stations during outage and non-outage periods, which included the supervision of workers. Projects included the construction of a containment unit around a transformer, the construction of a coal sampling system, and a coal bunker reinforcement project. In addition to these projects, Mr. Cullen handled all NPDES, CERCLA, and Title V permit renewals. Other work included the monitoring and inspection of numerous sediment ponds and respective dams used as pollution control in ash disposal sites and all upkeep of sediment and erosion control on all three power plants.

Project Engineer; Road Construction Support (with WVDEP coordination); WVDOT; WV. Oversaw contractor's activities on an $8,000,000 road construction project with working knowledge of plans and of specifications from the WVDOT. Responsible for construction inspection and calculations of roadway including concrete, fill and excavation, rebar, and other construction materials and operations. Oversaw sediment, erosion, and pollution control throughout the project. Mr. Cullen worked with the contractor on maintaining ditch checks, construction of sediment ponds, silt fence, and controlling run-off and discharge into a nearby stream. Coordinated with the WVDEP to ensure proper environmental procedures were followed.

ROBERT MERTZ, PE

Civil Engineer

EDUCATION
ME, Civil Engineering BS, Environmental Engineering
REGISTRATIONS
Professional Engineer: WV, PA, and OH
YEARS EXPERIENCE
30

Mr. Mertz is a civil engineer with more than 30 years of professional experience in project management, engineering, construction management, and quality assurance/quality control. He is a West Virginia registered Professional Engineer and has supported numerous civil engineering projects throughout his career. He has provided geotechnical and sedimentation and erosion control analyses, provided engineering design, developed sedimentation and erosion control plans, provided specifications, and QA/QC support for numerous projects and has also had coordination with state DEP agencies.

Project Engineer; Remedial Design Oversight; Welsh Road Landfill Superfund Site; Honey Brook Township, Chester County and Caernarvon Township, Lancaster County, PA. Provided senior review of remedial design submittals that included an evaporation/transpiration (E/T) cover system and associated performance monitoring for a 5.2 acre landfill. The remedy generally consisted of regrading the site to promote surface water drainage, installing an E/T cover system, and monitoring. The E/T cover system consisted of 3- and 4 feet thick rooting layers placed on the sideslope (greater than 10% slope) and plateau portions (less than 10% slope) of the site, respectively. The rooting zone would be comprised of intermediate textured soils (e.g., USDA silt loam, silty clay loam, and loam) and/or alternative fill cover materials (e.g., leaf compost or Class A biosolids). The rooting layer would be planted with phreatophytes (i.e., hybrid poplars, willows, and eastern cottonwoods) and interplanted with native hardwoods and conifers at a density of 770 trees per acre. The understory would be vegetated with cool and warm season grasses. The performance standards for the evaporation/transpiration cover system included attaining a standard of performance that was functionally equivalent with PADEP regulations.

Design Engineer; Remedial Design; Site 46 July 28, 1992 Landfill A, Stump Dump Road, Naval Surface Warfare Center Dahlgren, Dahlgren, VA. Assisted in the preparation of and peer reviewed remedial design documents consisting of a basis of design report, erosion and sediment control plan report, stormwater pollution prevention plan, construction drawings, specifications, and supporting calculations. Prepared post-removal action report following the remedial action. The remedy for the site consisted of excavation and off-site disposal of buried debris, contaminated soil, and contaminated sediment and wetland restoration and creation.

Senior Engineer; Feasibility Study; Site/SWMU 3 - Causeway Landfill, Marine Corps Recruit Depot; Parris Island, SC. Developed conceptual slope revetment, slope stabilization and erosion control measures for feasibility study alternatives. Estimated quantities for cost estimate and performed stability analysis for deep-seated failures through very loose sand and super soft clay underlying waste comprising the site.

GEORGE DUFFER, PE, PS

Civil Engineer / Surveyor

EDUCATION
BS, Civil Engineering
REGISTRATIONS
Professional Engineer: WV, PA, OH, KY Professional Surveyor: WV
YEARS EXPERIENCE
42

Mr. Duffer has more than 42 years of professional engineering experience. His expertise includes preparation of surface and deep mine coal permits that include detailed reclamation plans, massive earth moving, and environmental assessments. He is both a registered Professional Engineer and Professional Surveyor in West Virginia. Mr. Duffer has participated in three major projects (an industrial site, shopping center, and golf course) that were all originally coal surface mine sites.

Project Engineer; Abandoned Deep and Surface Mine Material Removal; Eastpointe Shopping Center; Clarksburg, WV. The project involved removing four million cubic yards of material over an abandoned deep and surface mine site. The deep mine voids and acid mine drainage were eliminated once the project reached grade. All infrastructure items were then completed. The site is now a major tax base for the city of Clarksburg, WV.

Project Engineer; Reclamation, Infrastructure and Mine Drainage Relocation/Usage; Pete Dye Golf Course; Harrison County, WV. The project was the construction of an 18 hole Championship Golf Course on an old surface and deep mine site in Harrison County, WV that would bear the name of its famous designer, Mr. Pete Dye. Reclamation, infrastructure, mine drainage relocation/usage and constant layout were part of my duties. The site has since held a number of nationwide tour events and still maintains a coal mining theme throughout the golf course.

Project Engineer; Industrial Park Construction on Old Surface Mine Site; Clarksburg, WV. The project was the construction of an industrial park complete with a railroad spur on an old surface mine site now in the city limits of Clarksburg, WV. The project involved a large earth moving operation, reclamation, temporary flood control and infrastructure. A number of businesses occupy the site.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

PETE VERMA, PE

Geotechnical/Structural Engineer

EDUCATION
MS, Mining Engineering MS, Civil Engineering BS, Integrated Engineering and Mining Engineering
REGISTRATIONS
Professional Engineer: PA, MD, VA
YEARS EXPERIENCE
33

Mr. Verma has over 33 years of experience in geotechnical design, and civil design for a variety of projects. He has extensive and diversified experience in the areas of geotechnical engineering, slurry walls, MSE, walls, surface water hydrology, hydrogeological analysis, general civil and concrete design, subsurface investigation, foundations design, retaining walls, sheet pile design, cellular structures and cofferdam design, groundwater analysis and dewatering, materials processing, and construction support.

Geotechnical Engineer; Subsidence Remediation; Various Clients; WV and OH. Served as the field/design engineer for several subsidence remediation, coal refuse and spoil pile remediation, bridge abutments, and up to 180 ft. high dam design projects in Ohio and West Virginia. These projects involved subsurface investigations, field testing, grading plans, hydrogeological analysis, construction drawings and specifications.

Geotechnical Engineer; Monterrey Coal Company Mine Reclamation; ExxonMobil Corporation; Southern IL. Performed design analysis for the installation of a two-foot soil cover over an area of 80 acres of fine coal refuse. The fine coal refuse had very low undrained shear strength of 100 psf (or less) and was not able to sustain the equipment loading designated for the construction. The water table was high and within a few feet of the existing ground surface. Performed design for the reinforcing material, and performed equipment selection such that they can operate on the low strength soil to install the cap. Established procedures for the reinforcing material installation and soil cover. Developed design criteria and specifications for the high strength reinforcing element and quality control documents.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Geotechnical Engineer; Hobet Mine Coal Reserve Analysis; Ashland Coal Company; KY. Performed coal reserve analysis, developed pit dimensioning computer program to facilitate mine planning and equipment selection, and developed critical path method schedules for open pit mining operation optimization at Hobet Mine of Ashland Coal Company in Kentucky.

HEATHER TREXLER, PG

Geologist

EDUCATION
MS, Geology BS, Geology
REGISTRATIONS
Professional Geologist: PA
YEARS EXPERIENCE
9

Ms. Trexler has more than nine years of experience as a project manager and geologist. Projects activities for mining development include the preparation of geologic and hydrologic sections of permits to state agencies in West Virginia for longwall expansions, new room and pillar mines, refuse expansions and associated surface activities. Additional technical projects include the evaluation of current and potential mine pools, reviewing current and potential impacts to water resources, managing mining compliance sampling programs and evaluating large-volume water quality analysis.

Project Manager; Marion County Reclaimed Mine Site Investigation; American Bituminous Power Partners, LP; Marion County, WV. Managed this project, which included a site assessment and general recommendations as to the possible sources of elevated levels of aluminum at the Barrackville Refuse and Mining Operations site in Marion County. The site was reclaimed from previous contour surface mining and auger mining. Tetra Tech conducted water and soil sampling and reviewed the history of the site and historical water quality data. Following the field work, Tetra Tech met with the client and recommended options to improve the soil condition and to achieve better run-off while reducing erosion so that discharges can meet state effluent limits.

Senior Geologist; Bailey Mine Expansion; CONSOL Energy; Greene County, PA. Managed permit expansion of longwall coal mine. Developed work plan for collection of necessary hydrologic and geologic data for permit application which included the door-to-door survey of over 200 properties for water supplies, installation of over 30 monitoring wells and monitoring of over 50 stream stations. Additionally, directed and managed field crews for collection of data, reviewed and performed quality control of field data, and evaluated potential ground water and surface water impacts due to proposed mining activity. Completion of this project included weekly communication with client for progress updates and communication with PADEP to address concerns or questions.

Senior Geologist; Cumberland and Emerald Mines Pre-Mine Surveys; Alpha Natural Resources; Greene County, PA. Managed field crews to conduct residential well pump tests and sampling program ahead of underground mining development. Reviewed mining projection maps and used ArcGIS to track progress and schedule field crews.

Project Geologist; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a geologist for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project Geologist; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a project geologist for this five-

year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Project Manager; Enlow Fork Mine Expansion; CONSOL Energy; Greene/Washington Counties, PA. Managed permit expansion of longwall coal mine. Developed work plan for collection of necessary hydrologic and geologic data for permit application which included the door-to-door survey of over 500 properties for water supplies, installation of over 40 monitoring wells and monitoring of over 60 stream stations. Additionally, directed and managed field crews for collection of data, reviewed and performed quality control of field data, and evaluated potential ground water and surface water impacts due to proposed mining activity. Completion of this project included weekly communication with client for progress updates and communication with PADEP to address concerns or questions.

Project Manager; Enlow Fork & Bailey Mine Surface Activities; CONSOL Energy; Greene/Washington Counties, PA. Prepared geology and hydrology sections of permit applications for shafts, boreholes and portal facilities for support of underground mining activities. Developed work plan for collection of necessary hydrologic and geologic data for permit application, directed and managed field crews for collection of data, reviewed and performed quality control of field data, and evaluated potential ground water and surface water impacts due to proposed mining activity. Completion of this project included weekly communication with client for progress updates and correspondence with PADEP to address concerns or questions.

Project Manager; Bailey Mine Refuse Expansion; CONSOL Energy; Greene County, PA. Prepared geology and hydrology sections of permit application for expansion of refuse impoundments to support of underground mining activities. Developed work plan for collection of necessary hydrologic and geologic data for permit application and a detailed evaluation of potential ground water and surface water impacts due to proposed activity. Completion of this project included weekly communication with client for progress updates and communication with PADEP to address concerns or questions.

Project Manager; Kocjancic; Rosebud Mining Company; Clarion County, PA. Prepared geology and hydrology sections of permit applications for new underground room and pillar mine. Reviewed field data collected by other consultant and evaluated potential ground water and surface water impacts due to proposed shallow depth of mining activity. The assessment of potential impacts was complicated by previous surface mining above the proposed underground mine and the potential for a post-mining break-out of the mine pool. Completion of this project included regular communication with client for progress updates and correspondence with PA DEP to address concerns or questions.

Project Manager; Meigs Complex Mine Pool; CONSOL Energy; Meigs County, OH. Prepared Probable Hydrologic Consequence Statement for three recently closed longwall mines to determine expected date of filling of void, potential for breakout of mine pool and expected changes in quality of mine pool over time. Reviewed historic data for amount of void space, discharge quality of mine water and local aquifer depths. Prepared report to Ohio Department of Natural Resources detailing history of the mines, current status of mine pool quality and quantity, expected mine pool quality and quantity, potential for beneficial use of mine pool and mine pool management strategies.

JOSHUA WHITNEY, PE

Mining Engineer

Mr. Whitney has more than five years of environmental, geologic, and mining-related experience including mine design, operation permitting, environmental impact analyses, low seam surface and underground coal mine planning, open pit aggregates, underground salt mining, and slope/highwall stability analysis. His experience also includes collaboration with federal and state regulatory agencies.

EDUCATION
MS, Mining/Minerals Engineering BS, Mining/Minerals Engineering
REGISTRATIONS
Professional Engineer: PA
YEARS EXPERIENCE
5

Mining Engineer; Cresson Mine Pool Project; PADEP Bureau of Abandoned Mine Reclamation; PA. Assisted with this project involving the treatment of mine pool water and subsequent discharge into Clearfield Creek for agricultural use within the watershed.

Mining Engineer; Abandoned Coal Mine Fire Remediation; Confidential Client; PA. A natural gas drilling client experienced elevated temperatures in excavated materials due to a burning abandoned coal mine. Tetra Tech investigated the subsurface conditions and Mr. Whitney assisted with a Mine Fire Remediation Plan for the client.

Mining Engineer; Gladden Discharge/Stream Sealing; South Fayette Conservation Group; South Fayette, PA. Determined flow losses using continuous water level monitors and weir calculations, designed two stream channels and a grouting plan to reduce flow into the mine, and prepared a Joint Chapter 105/Section 404 permit to permit construction within the stream channels.

Mining Engineer; Bird Mine and Strayer Refuse Permitting and Water Treatment Design; AMD Industries, Inc.; Tire Hill, PA. Assisted with completing two different PADEP mining activity permit renewals for the Strayer Refuse Site and for the Bird Mine Treatment Facility. Mr. Whitney also assisted with water treatment design and refuse pile quantification and quality analysis at the Bird Mine.

Mining Engineer; Mine Subsidence Investigation; Virginia Department of Mines, Minerals, and Energy; Wise County, VA. Participated in an investigation to characterize suspected mine voids on two residential properties which exhibited evidence consistent with mine subsidence. Work consisted of a property survey, a GPR survey, and generation of mapping and a drilling investigation plan. Mr. Whitney assisted with the report, which included recommendations for addressing the subsidence.

Mining Engineer; Quecreek #1 Deep Mine Expansion; PBS Coals, Inc.; PA. Supported a detailed adjacent mine study to determine the location of any adjacent mines so that the client could plan mining operations around those workings. He assisted with a geologic analysis, water quality and hydrogeologic analysis, and a pillar stability analysis.

JON LUDWIG

Project Scientist

EDUCATION
MS, Environmental Pollution Control BS, Environmental Science
REGISTRATIONS
N/A
YEARS EXPERIENCE
16

Mr. Ludwig is a senior environmental scientist with over 16 years of experience providing technical and management support for clients in the areas of water resources, watershed and water quality assessment, watershed modeling and Total Maximum Daily Load (TMDL) development. Mr. Ludwig has played a key role in the development of multiple water quality models to dynamically simulate the fate and transport of metals associated with legacy mining activities. He currently serves as the Project Manager for multiple water quality modeling projects, including water quality evaluation for the Cresson Mine Pool project for PADEP.

Project Manager; Paint Branch Mine Portals; WVDEP; Paint Branch, WV. Mr. Ludwig managed this project for the West Virginia Department of Environmental Protection (WVDEP) Office of Abandoned Mine Lands. The agency retained Tetra Tech to develop a reclamation design of an abandoned underground mining site in Paint Branch, WV in 2010. The site consisted of three open mine portals and approximately 42 abandoned bridge piers. Topographic mapping of the site was prepared and used by Tetra Tech to develop a design including construction drawings, specifications, and a construction cost estimate. An erosion and sedimentation control plan was also completed. Tetra Tech also provided construction support.

Project Manager; Mining NPDES Permit Support for WVDEP; WV. Over the past few years, Tetra Tech has supported WVDEP in the development of metals TMDL development for the Coal River watershed. At the request of WVDEP, Tetra Tech conducted a comprehensive analysis to determine the cumulative effect of backsliding at various downstream locations in the Coal River watershed. Served as the project manager and technical lead for this project that utilized the calibrated watershed model that was constructed for TMDL development (MDAS) to provide solutions and guidance as to which areas of the Coal River watershed could sustain manganese technology-based effluent limits while maintaining compliance with water quality criteria in the effective zones.

Project Scientist; Cresson Mine Pool Project; PADEP Bureau of Abandoned Mine Reclamation; PA. Tetra Tech was retained for this project involving the treatment of mine pool water and subsequent discharge into Clearfield Creek for agricultural use within the watershed. Mr. Ludwig managed the water quality evaluation portion of this project.

Project Manager; TMDL Development for Mining-related Water Quality Impairments; PADEP/WVDEP/EPA; PA and WV. Served as project manager in the development of over 3,000 TMDLs for mining related water quality impairments throughout West Virginia and Pennsylvania. In support of EPA Region 3, WVDEP, and PADEP, provided lead role both technically and administratively in the evaluation of data and pollutant sources to assess and determine relationships between acid mine drainage and in-stream metals concentrations. Applied the Environmental Fluid Dynamics Code (EFDC), a 3-dimensional hydrodynamic model, to develop TMDLs for the Monongahela River mainstem.

SAMUEL WILKES, PWS

Project Scientist

Mr. Wilkes is an environmental scientist providing technical support to clients, such as the WVDEP and the WVDHHR, US Forest Service, Bureau of Land Management, and the EPA. He also provides technical support to clients pertaining to abandoned mine site investigations, abandoned mine land inventories, contaminant transport in surface waters, environmental contamination, and potentially responsible party searches. He is proficient in contaminant source identification and characterization, site assessments contaminant migration pathways, and customized surface water modeling for abandoned mine sites.

EDUCATION
MS, Environmental Science and Policy BS, Earth & Environmental Science
REGISTRATIONS
Professional Wetland Scientist
YEARS EXPERIENCE
15

Project Scientist; Mining NPDES Permit Support for WVDEP; WV. Tetra Tech conducted a comprehensive analysis to determine the cumulative effect of backsliding at various downstream locations in the Coal River watershed. Supported this project that utilized the calibrated watershed model that was constructed for TMDL development (MDAS) to provide solutions and guidance as to which areas of the Coal River watershed could sustain manganese technology-based effluent limits while maintaining compliance with water quality criteria in the effective zones.

Field Coordination Manager; Abandoned Mine Land Surveys; U.S. Forest Service; Gila and Lincoln National Forests in NM. Served as the field coordination manager and assisted with the inventory of over 700 abandoned mine sites. Responsible for the preliminary review of the AML database, plotting AML sites on topographic maps, and assisting in the three months of site field verification. Once site locations were verified, GPS coordinates; photographs, and an abandoned mine land inventory worksheet (which included information about open audits, shafts, tailings piles, overburden piles, acid mine drainage, subsidence, and any other human or environmental hazards) were completed for each site.

Project Scientist; TMDL Development for Mining-related Water Quality Impairments; PADEP/WVDEP/EPA; PA and WV. In support of EPA Region 3, WVDEP, and PADEP, assisted in the development of over 3,000 TMDLs for mining related water quality impairments throughout West Virginia and Pennsylvania. Work included the evaluation of data and pollutant sources to assess and determine relationships between acid mine drainage and in-stream metals concentrations.

Project Scientist; Abandoned Mine and Mill Sites Removal Preliminary Assessments; U.S. Forest Service; AZ and NM. Conducted several removal preliminary assessments for the USFS at various abandoned mine and mill sites. Many of the mines used cyanide leaching techniques to recover gold and silver along with other metals, such as copper, lead, and zinc as by products. Other hard rock mines investigated produced uranium and mercury ores for milling.

Project Scientist; Promontory Butte Mine Site Research and Removal Preliminary Assessment; U.S. Forest Service; Payson, AZ. Conducted research for a limited potentially responsible party (PRP) search and a removal preliminary assessment for the Promontory Butte Mine Site near Payson Arizona.

CARL STRAKAL

Civil Engineer

EDUCATION
BS, Civil Engineering Technology
REGISTRATIONS
Certified Pre-Blast Surveyor: WV (WVDEP)
YEARS EXPERIENCE
10

Mr. Strakal has more than ten years of mining experience. He has completed and submitted surface mining related permits to the WVDEP utilizing the e-permitting process. Mr. Strakal has also performed water quality monitoring in accordance with PADEP compliance regulations for various clients and projects. His experience includes completing and submitting various surface (SMP) and deep mine (CMAP) permitting modules.

Engineer II; WVDEP Loveridge Permitting; Consolidated Coal Company; Marion County, WV. Completed and submitted various WVDEP IBR, AML and Degasification pad permits utilizing E-permitting per Loveridge Mine in Marion County, WV. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Engineer II; WVDEP Robinson Run Permitting; Consolidated Coal Company; Harrison County, WV. Completed and submitted various WVDEP IBR, AML and Degasification pad permits utilizing E-permitting per Robinson Run Mine in Harrison County, WV. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Project Engineer; 13-West Airshaft PADEP CMAP Modules; Consolidated Coal Company; Pine Bank, PA. Completed and submitted various PADEP CMAP Modules at Airshaft site for the Blacksville Number 2 mine. He generated base mapping for all associated modules and conducted all necessary field work per module requirements.

Project Engineer; 13-Degas PADEP CMAP Modules; Consolidated Coal Company; Pine Bank, PA. Completed and submitted various PADEP CMAP modules for degasification pads and access roads. He generated base mapping for all associated Modules. Also conducted all of the necessary field work for the project for module requirements.

Project Engineer; Stone Quarry PADEP SMP Modules; Confidential Client; Haydentown, PA. Completed and submitted various PADEP SMP modules for the Stone Quarry (Limestone). He generated base mapping for all associated modules and conducted all necessary field work for module requirements.

Project Engineer; Prime Air Shaft PADEP CMAP Modules; MEPCO; Mt. Morris, PA. Completed and submitted various PADEP CMAP modules for the Prime Air Shaft. He generated base mapping for all associated Modules and conducted all necessary field work for module requirements.

Project Engineer; Blacksville No. 2 Mine/Robert's Run Airshaft PADEP CMAP Modules; Consolidated Coal Company; Pine Bank, PA. Completed and submitted various PADEP CMAP modules for the Airshaft site for the Blacksville Number 2 mine. He generated base mapping for all associated modules and conducted all necessary field work for module requirements.

ROBERT DURSO, EIT

Civil Engineer

EDUCATION
BS, Civil and Environmental Engineering
REGISTRATIONS
Engineer-in-Training: PA
YEARS EXPERIENCE
3

Mr. Durso has more than three years of experience supporting mining-related projects. Mr. Durso is a civil/design engineer with experience in a variety of mining-related projects. His experience includes sampling of mine water discharges, estimating mine pool volumes and water balances, and analyzing lab results. Mr. Durso is also involved with the submittal of mining permits to PADEP. He also currently serves as a project engineer on two statewide abandoned mine land reclamation contracts with PADEP.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

Project Engineer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a project engineer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Project Engineer; Mine Pool Evaluation Studies; Chevron Appalachia, LLC; Southwestern PA. Mr. Durso has been involved with a variety of mine pool evaluation studies for Chevron Appalachia in southwestern Pennsylvania. As a part of these studies, he has been involved from the project beginnings through completion. Working on these projects, Mr. Durso has performed sampling of mine water discharges, analyzed lab results, investigated mine maps, analyzed mining regions in the area, estimated mine pool volumes and water balances, drafted mine pool evaluation reports, and performed revisions of reports following reviews.

Project Engineer; Mine Seep Analysis; Confidential E&P Marcellus Shale Client; PA. Mr. Durso has assisted in the collection and organizing of water quality data for a mine seep at a well pad site for a confidential oil and gas client operating within the Marcellus Shale. He also researched initial wetland designs for possible treatment.

Project Engineer; Quecreek Mine Expansion Permit; Quecreek Mine; PA. Mr. Durso assisted with the development of a mine expansion permit for submittal to PADEP.

ROBERT MUSSETTER, PHD, PE

Stream Channel Designer / Hydraulic Engineer

Dr. Mussetter has extensive experience with relocation and restoration of mine waste-impacted streams both within the US and internationally. Overall, he has more than 31 years of experience in stream channel design, and the application of hydrology, hydraulics and sediment transport to river engineering and restoration, channel bed and bank stabilization, habitat restoration for both warm- and cold-water fish species, riparian restoration, flood management, and levee stability analysis. Dr. Mussetter has extensive experience with hydrologic (HEC-1, HMS), one-and two-dimensional hydraulic (HEC-2, UNET, HEC-RAS, FLO-2D, RMA-2, SRH-2D) and sediment transport (HECRASv.4.0, HEC-6T, SAM) models and their application to channel restoration and stabilization.

EDUCATION
PhD, Civil Engineering MS, Civil Engineering BS, Civil Engineering
REGISTRATIONS
Professional Engineer: WI, LA, TX, SD, AZ, CO, MT, NM, CA, ID
YEARS EXPERIENCE
31

Project Manager/Designer; Channel Restoration Analysis and Design, Batu Hijau Gold-Copper Mine Project; Newmont Mining Company. Project manager and engineer responsible for developing and implementing channel stabilization and restoration measures for 11 in-channel sand and gravel mines located on four rivers (Sekongkang, Sejorong, Santong, Bambu) on the Island of Sumbawa. The objective was to develop a basis of design to prevent further channel instability and loss of riparian forest, as well as reducing sediment delivery to coral reefs that fringe the island as a result of mine development activities.

Principal Engineer; San Miguel River Corridor Restoration Plan; Town of Telluride; Telluride, CO. Principal Engineer for restoration of 1.5 miles of the mining impacted San Miguel River through the Town of Telluride, Colorado. Geomorphic, hydrologic, hydraulic and sediment transport studies were conducted to develop a basis of design for the restoration of the river and improvement of in-channel and channel margin habitat while still meeting the requirements of the National Flood Insurance program. A sediment detention structure was designed for the head of the reach to balance the sediment supply to the transport capacity of the restored channel. Floodplain mapping and applications for a CLOMR and LOMR were prepared.

Principal Engineer; Kensington Gold Project, Tailings Reclamation Plan Review and Redesign; Echo Bay Alaska, Inc. Principal engineer for the quantification of fluvial and debris flow sediment delivery to a leach heap tailings impoundment constructed across the glaciated valley floor in the Coastal Mountains of southeast Alaska. Development of an alluvial fan steady-state area-volume relationship to determine the spatial distribution of sediment deposition across the impoundment. Preliminary design of a channel conveyance system to route diverted streams across the tailings impoundment following reclamation.

Project Manager/Designer; Design of a Reclamation and Channel Restoration Plan for Redex Mine Reach of Whitewood Creek; Homestake Mining; SD. Managed development of a channel and valley floor reclamation and restoration plan for two miles of a severely tailings-impacted and placer mined reach of Whitewood Creek in the Black Hills of South Dakota where flood flows had breached the pit berms and captured the stream.

JAMES COFFMAN

Geophysicist

EDUCATION
MS, Geophysics BS, Geology
REGISTRATIONS
N/A
YEARS EXPERIENCE
16

Mr. Coffman has more than 16 years of experience leading, performing, and interpreting results for hundreds of surface and borehole geophysical surveys. His experience in environmental geophysics is comprehensive and he has also performed this work for abandoned mine land projects, targeting mine voids. His concentration has been in surveys using electromagnetics (EM), ground penetrating radar (GPR), magnetics, seismic refraction, electrical resistivity, borehole geophysics, and utility location equipment.

Project Geophysicist; Geophysical Survey for Mining Investigation at Two Sites; South Fayette Township; South Fayette, PA. Performed a geophysical survey using a multi-frequency EM instrument to help locate possible fractures related to stream loss. Processed and interpreted all data, and summarized the geophysical results on figures and in a brief narrative.

Geophysicist; Mine Subsidence Geophysical Investigation at Two Sites; Virginia Department of Mines, Minerals, and Energy; Wise County, VA. Mr. Coffman participated in an investigation to characterize suspected mine voids on two residential properties which exhibited evidence consistent with mine subsidence. He performed GPR survey to search for potential mine openings (spaces). Processed and interpreted all data, and summarized results for inclusion in a report.

Project Geophysicist; Geophysical Survey for UST Investigation; Confidential Commercial Client; Clearfield, PA. Mr. Coffman performed a geophysical survey using EM61 and magnetic locator instruments to search for possible underground storage tanks. Processed and interpreted all data, and summarized the geophysical results for inclusion in a report.

Project Geophysicist; Geophysical Survey for Disposal Area Investigation; USDA; Beltsville, MD. Performed a geophysical survey using EM31 and electrical resistivity to locate possible disposal areas. Processed and interpreted all data, and summarized the geophysical results in a report for submittal to the Client.

Project Geophysicist; Geophysical Surveys for Utility Locating Investigation at Four Sites; U.S. Navy; Indian Head, MD. Performed geophysical surveys using EM31, GPR, and pipe locator instruments at four sites to locate utilities for proposed borings. Processed and interpreted all data, and summarized the geophysical results on figures and in a brief narrative.

Project Geophysicist; Geophysical Surveys for Utility Locating Investigation; U.S. Coast Guard; Indian River, DE. Performed geophysical surveys using GPR and a pipe locator instrument around five proposed boring locations to locate possible utilities. Processed and interpreted all data, and summarized the geophysical results on figures.

BEN HOPPE

CAD Designer

EDUCATION
AAS, Drafting
REGISTRATIONS
N/A
YEARS EXPERIENCE
10

Mr. Hoppe has more than ten years of professional CADD experience. He has conducted work for several abandoned mine land reclamation projects, including those for the West Virginia Department of Environmental Protection's Office of AML, and erosion and sediment control plans. He is the CAD manager for the Pittsburgh office.

CAD Designer; Fisher Run Portal Closure; West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands and Reclamation; Weston WV. Mr. Hoppe's responsibilities included creating existing conditions plans and sections along with mine void information to adequately design structures to seal mine and convey mine water discharge.

CAD Designer; Tunnelton Mine Portal Closure Design for Acid Mine Drainage; West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands and Reclamation; Tunnelton, WV. Mr. Hoppe's responsibilities included creating existing conditions plans and sections along with mine void information to adequately design structures to seal mine and convey mine water discharge.

CAD Designer; Paint Branch Mine Project; West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands and Reclamation; Kanawha, WV. Mr. Hoppe performed design services on this project, which included the installation splash pads and metal bat gates on three abandoned mine portals and removal approximately 48 abandoned bridge piers in Paint Branch.

CAD Designer; Gladden Mine Discharge Passive Treatment System (in association with PADEP); South Fayette Conservation Group; South Fayette Township, PA. Design required creation of existing conditions plans and sections along with design of 2 ½ acre pond separated into 3 chambers using earthen berms. Pond required berm with graded access road into pond area and along perimeter. Sections and profiles were created along pond and access road. Access road required horizontal and vertical geometry to be included on plan and profiles.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

ZACHARY MOORE

CAD Designer

EDUCATION
AS, Drafting
REGISTRATIONS
N/A
YEARS EXPERIENCE
7

Mr. Moore is a CAD Designer with more than seven years of relevant experience. Throughout his career, he has supported numerous abandoned mine land projects with CAD design. His expertise includes different phases of civil design work including but not limited to, site grading, proposed roadway geometry layout, bridge design and rehabilitation, maintenance of traffic plans. He has experience with programs such as AutoCAD 2000/2004/2007, AutoCAD Civil 3D, Autodesk Architectural Desktop, Microstation V8, Microstation XM, Microsoft Word, Excel, PowerPoint, Outlook, Adobe Photoshop, and 3D Studio Max.

CAD Designer; Fishing Run Stream Sealing; South Fayette Conservation Group (SFCG) in Association with PADEP; South Fayette Township, PA. This project included the 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. Mr. Moore created existing site and existing grade files from survey data and PASDA information, designing and location all E&S controls, standard notes & details, profiles, and cross sections.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

CAD Designer; CAD Support for Various Pipeline Projects; MarkWest Liberty Midstream & Resources LLC; Southwestern PA. Provided CAD support for creating existing site and existing grade files from survey data and PASDA information, designing and locating all E&S controls and providing standard notes & details, and GP5's for approximately 30 pipelines (approximately 68 miles) for this client operating in the Marcellus Shale.

CAD Designer; CAD Support; Burnett Oil Company, Inc.; Southwestern PA. Created existing conditions, proposed grading and E&S controls along with construction stakeout drawings and site cross-sections for a pipeline and impoundment for this client operating in the Marcellus Shale.

NICHOLE NAJESKI

CAD Designer

EDUCATION
AS, Drafting
REGISTRATIONS
N/A
YEARS EXPERIENCE
3

Ms. Najeski has more than three years of experience in CAD Design and has supported various abandoned mine land reclamation projects. Her responsibilities have included creating and modifying elevations, level drawings, base levels, and site plans for wireless infrastructure; performing quality assurance tasks; maintaining cycle times for normal course of business during integration; communicating with area representatives and field technicians to resolve conflicting data; reviewing site data for accuracy; and preparing cross sections, site location maps, surface soil and groundwater sampling maps, and conceptual site model figures. Ms. Dilla has experience operating programs such as AutoCAD 2000/2004/2008/2009/2010, AutoCAD Civil 3D, Autodesk Architectural Desktop, Autodesk Inventor, Autodesk Map, Autodesk Raster Design, Microsoft Word, Excel, PowerPoint, Outlook, Adobe Photoshop, Adobe Illustrator, and Google Earth.

CAD Designer; Majorsville Pipeline Subsidence CAD Support; Southwestern PA. Tetra Tech performed a preliminary subsidence investigation for a natural gas pipeline for MarkWest Energy. Tetra Tech was tasked with evaluating the potential for subsidence along two proposed natural gas pipeline alignments totaling over 28 miles in length in southwestern Pennsylvania. Provided CAD support for the Majorsville Pipeline project in Southwestern Pennsylvania. Tasks included creating erosion and sediment control plan set drawings.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

CAD Designer; CAD Support for Various Pipeline Projects; MarkWest Liberty Midstream & Resources, LLC; Southwestern PA. Provided CADD support for creating existing site and existing grade files from survey data and PASDA information and GP5's for approximately 6 pipelines.

CAD Designer; CAD Support for Former Howe's Leather Site; Curwensville, PA. Provided CAD support for the Former Howe's Leather Site in Curwensville, Pennsylvania. Tasks included creating a detailed site area map based off of Google Earth images, location map, vicinity map, groundwater sampling location map, and surface soil sampling location map.

CARLY KRAMER

CAD Designer

EDUCATION
AS, Drafting
REGISTRATIONS
N/A
YEARS EXPERIENCE
6

Ms. Kramer has more than six years of experience and has supported numerous mining-related and abandoned mine land projects. Her responsibilities have included creating and modifying elevations, level drawings, base levels, and site plans for wireless infrastructure; performing quality assurance tasks; maintaining cycle times for normal course of business during integration; communicating with area representatives and field technicians to resolve conflicting data; reviewing site data for accuracy; and preparing cross sections, site location maps, surface soil and groundwater sampling maps, and conceptual site model figures.

CAD Designer; Paint Branch Mine Portals; WVDEP; Paint Branch, WV. The West Virginia Department of Environmental Protection (WVDEP) Office of Abandoned Mine Lands retained Tetra Tech to develop a reclamation design of an abandoned underground mining site in Paint Branch, WV in 2010. The site consisted of three open mine portals and approximately 42 abandoned bridge piers. Ms. Cramer support this project with CAD services.

CAD Designer; Fishing Run Stream Sealing; South Fayette Conservation Group (SFCG) in Association with PADEP; South Fayette Township, PA. Project involved the 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. Ms. Cramer supported this project with CAD services.

CAD Designer; Mine Subsidence Investigation; Virginia Department of Mines, Minerals, and Energy; Wise County, VA. Participated in an investigation to characterize suspected mine voids on two residential properties which exhibited evidence consistent with mine subsidence. Work consisted of a property survey, a GPR survey, and generation of mapping and a drilling investigation plan. Ms. Cramer assisted on this project with CAD support.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects.

CAD Designer; 2012 Professional Design Services Contract; Pennsylvania Department of Environmental Protection, Bureau Mining Programs; PA. Serving as a CAD designer for this five-year $5M mining engineering contract to provide professional design services to remediate problems such as open mine portals, acid mine drainage, mine fires, highwalls, and subsidence projects with a second PADEP mining agency.

Expanded Project Descriptions

WVDEP Tunnelton Mine Portal Closure Design

Tunnelton, West Virginia

CLIENT/CONTACT:

West Virginia Department of Environmental Protection

PROJECT HIGHLIGHTS:

- Design of wet and dry seals for abandoned mine portals
- Coordination with local property owners
- Construction administration

The West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands & Reclamation (AMLR) retained Tetra Tech in 2009 for the investigation and design for the closure of two mine portals on two separate private parcels. One portal allowed acid mine drainage to exit and flow off-site. The design included evaluating multiple closure alternatives and developing regrading plans that balanced cut and fill. The project included the use of a drilling subcontractor to perform soil borings at one portal to determine the nature and properties of overburden material and the elevation of the mine pool. The project plan also involved the demolition of an abandoned concrete mining structure.



Tetra Tech also used a local land surveyor to survey the portals and gather topographic information of the adjacent land area to support site grading and portal closure design. Coordination with the private property owners was necessary to restore the properties to acceptable conditions. Because one portal was located directly behind a private garage, it required a closure plan to minimize impacts to the garage. Tetra Tech prepared construction drawings, specifications, construction cost estimates and erosion and sediment control permits for public bidding of the project by the West Virginia Department of Environmental Protection/Office of AMLR.

"The strong leadership of Tetra Tech's management team and the exceptional performance of their technical staff have provided WVDEP with high-quality and cost-effective products under past and existing contracts."

David Montali
West Virginia Department of Environmental Protection

WVDEP Fisher Run Mine Portal Closure Design

Weston, West Virginia

CLIENT/CONTACT:

West Virginia Department of Environmental Protection

PROJECT HIGHLIGHTS:

- Design of six wet mine seals and one bat gate
- Hydrologic and hydraulic analysis
- Coordination with property owners

In 2009, The West Virginia Department of Environmental Protection, Office of Abandoned Mine Lands & Reclamation (AMLR) retained Tetra Tech for the investigation and design for the closure of seven mine portals on private property. The portals allowed acid mine drainage to exit and flow into a small stream. The design included evaluating multiple closure alternatives and developing regrading plans that balance cut and fill. The project included the use of a drilling subcontractor to perform soil borings at the portals to determine the nature and properties of the overburden material and the elevation of the mine pool. Tetra Tech also used a local land surveyor to survey the portal and gather topographic information of the adjacent land area to support site grading and portal closure design.

Tetra Tech also performed a hydrologic and hydraulic analysis of the receiving stream to determine the effect on the stream due to site grading. Coordination with the private property owners was necessary to restore the property to an acceptable condition. A bat gate was installed on one mine portal. Construction drawings, specifications, construction cost estimates and erosion and sediment control permits were prepared for public bidding of the project by the West Virginia Department of Environmental Protection/Office of AMLR.





WVDEP Paint Branch Mine Portal Closure Design

Kanawha County, West Virginia

CLIENT/CONTACT:

West Virginia Department of Environmental Protection

PROJECT HIGHLIGHTS:

- Design of three abandoned mine portal seals
- Simple, innovative bat gate design

The West Virginia Department of Environmental Protection (WVDEP) Office of Abandoned Mine Lands retained Tetra Tech to develop a reclamation design of an abandoned underground mining site in Paint Branch, WV in 2010. The site consisted of three open mine portals and approximately 42 abandoned bridge piers. Topographic mapping of the site was prepared and used by Tetra Tech to develop a design including construction drawings, specifications, and a construction cost estimate. An erosion and sedimentation control plan was also completed. Tetra Tech also provided construction support.

The design challenges of the site included steep terrain, which limited access to the site, and narrow openings which had to be fitted with seals that would allow bats access. The traditional bat gate mine portal seal design of installing a large oval pipe with metal bars into the mine opening was not suitable for use at this site due to access restrictions and the limited size of the opening. Tetra Tech developed a simple new design which consisted of a matrix of welded steel bars directly mounted to the rock face. The project has been constructed and the design has already been adopted by the WVDEP at other mine portal sites.





WVDEP TMDL Development

West Virginia (Statewide)

CLIENT/CONTACT:

West Virginia Department of Environmental Protection

PROJECT HIGHLIGHTS:

- Development of more than 3,500 TMDLs in West Virginia
- Collaboration between Tetra Tech and various state entities

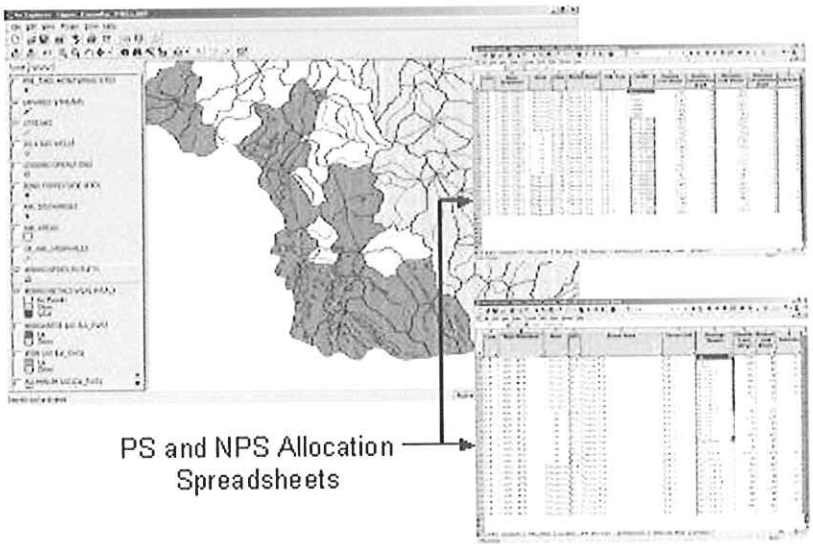
Over the past 13 years, Tetra Tech has supported West Virginia Department of Environmental Protection (WVDEP) and Environmental Protection Agency Region 3 (EPA), to develop and fine-tune a Total Maximum Daily Load (TMDL) methodology to address various water quality impairments in West Virginia, including biological, iron, manganese, dissolved aluminum, pH, fecal coliform bacteria, and sediment. Originally designed to meet aggressive consent decree deadlines, this innovative TMDL modeling approach was developed using the Mining Data Analysis System (MDAS) to simulate in-stream flow and water quality conditions (based on point and nonpoint contributions) throughout large watersheds. MDAS is a comprehensive GIS, dynamic modeling, and analysis package that provides the ability to overcome the difficult simulation of a large-scale watershed while maintaining a great level of detail (i.e., segmenting watersheds into hundreds of smaller hydrologic units to address impairments in small nested tributaries). The watershed modeling process also involved the compilation of meteorological, land use, stream and land use-specific hydrology and pollutant data; hydrologic calibration and water quality calibration; and generation of nonpoint source and in-stream flows and pollutant loadings. In order to account for the multiple mining related sources, additional land use categories that are specific to AMD were represented as nonpoint sources (e.g. high walls, disturbed land, and abandoned mines). In addition, several thousand permitted mining discharges in multiple phases of reclamation exhibiting various water quality conditions were represented as point sources that simulated characteristics of precipitation driven discharges.

Development of the methodology also involved close collaboration between Tetra Tech, various divisions within WVDEP, including Division of Water and Waste Management, Division of Mining and Reclamation, Division of Oil and Gas, Division of Natural Resources, and Division of Forestry, and EPA Region 3. Tetra Tech took the technical lead in most areas, including recommending targeted in-stream monitoring data; requesting, processing, and managing permit information for several thousand mining discharges; collecting and analyzing abandoned mine land data; model development and application; defining a consistent, acceptable allocation procedure; developing TMDL reports; and presenting the TMDL approaches and results to the public.

To further improve the "usability" of the TMDLs, Tetra Tech developed a series of interactive tools to provide TMDL implementation guidance. These tools were designed to simplify and assist "implementers" (nonpoint source staff and permit writers) utilize the TMDLs to develop watershed plans and issue/renew permits. An interactive ArcExplorer geographic information system (GIS) project allows the user to explore the spatial relationships of the source assessment data, as well as further details related to the data. Users are also able to "zoom in" on streams and other features of interest. In addition, spreadsheet tools (in Microsoft Excel format) were developed to provide the data used during the TMDL development process, and the detailed source allocations associated with successful TMDL scenarios. These tools provide guidance for selection of implementation projects as well as for permit issuance. Furthermore, Tetra Tech is currently developing a web enabled TMDL viewer tool that integrates a GIS interface with an online database, enhancing the user's ability to explore and utilize TMDL results quickly and efficiently. The TMDL viewer tool will be available for use upon public notice of the draft TMDLs in the near future.

To date, Tetra Tech has developed over 3,500 TMDLs in West Virginia using this methodology to meet strict consent decree deadlines, including 1,180 waterbodies and eight different pollutants (including pH, aluminum, iron, manganese, chloride, selenium, siltation, and biological impairments). TMDLs resulting from this approach are technically defensible, approved by EPA, and consistent with WV permitting processes (and are now part of an ongoing permit review process).

ArcExplorer GIS Viewer



Consulting Services for Remining Operations

Marion and Tucker Counties, West Virginia

CLIENT/CONTACT:

Dirtcon Excavating

PROJECT HIGHLIGHTS:

- Miscellaneous permitting
- Mine planning
- Surveying/aerial photography
- Geotechnical investigations
- Soil/water sampling
- Pre-blast survey
- Reclamation plan

Tetra Tech was retained by Dirtcon Excavating to provide miscellaneous engineering and environmental consulting services for several state quarry operations located in Marion and Tucker Counties in West Virginia.

Tetra Tech's services included reconnaissance of property mapping and deeds, review of the mining history for each site, water and soil/rock sampling, permitting, aerial photography and surveying, pre-blast surveys, and other related services.

Both operations are scheduled to be expanded through the permit modification process as regulated by the WVDEP Division of Mining and Reclamation. The Marion County site is undergoing the permit process to be developed as an industrial business park to service the growing demand for commercial/industrial development that is occurring within the general area.

Both sites represent areas that have been previously mined using surface and deep mining methods. The Marion County quarry site is permitted for the extraction of coal in addition to the stone products being developed. The coal extraction involves areas which were previously subjected to underground mining activities. The 'remining' of these areas is allowing for further recovery of the coal resources and is also eliminating an environmental situation that could potentially result in the production of substandard water quality conditions.

Tetra Tech was instrumental in providing mapping and guidance in determining the remining potential for this site.





Marion County Reclaimed Mine Site Investigation

Marion County, West Virginia

CLIENT/CONTACT:

American Bituminous Power Partners, LP

PROJECT HIGHLIGHTS:

- Reclaimed mine site investigation
- Review of mining history of the site
- Review of historical water quality data
- Soil/water sampling

In 2012, Tetra Tech was retained by American Bituminous Power Partners, L.P. (ABPP) to perform a site assessment and provide general recommendations as to the possible source and corrective actions for elevated levels of aluminum at the Barrackville Refuse and Mining Operations site in Marion County, West Virginia. The site has been reclaimed from previous contour surface mining and auger mining. Elevated levels of aluminum have been detected in the discharge of several of the retention ponds that control runoff from the site. The area draining to these structures has been reclaimed from the previous mining but was exhibiting poor vegetation reestablishment.

The purpose of this investigation was to determine the reason for poor vegetation establishment and the possible source of aluminum in the pond discharges. Tetra Tech reviewed the mining history of the site and historical water quality data, conducted a site review and collected soil and water samples.

The results of the water and soil sampling indicated that the topsoil used for reclamation had a naturally low pH that was releasing high levels of soluble aluminum. The review of the site also indicated that the reclamation was not protecting against erosion which was increasing run-off of the soil. Tetra Tech met with the client and recommended options to improve the soil condition, better control run-off and reduce erosion so that discharges from the site can meet state effluent limitations.





PADEP Statewide Mining Engineering Reclamation Design Contracts

Statewide Pennsylvania

CLIENT/CONTACT:

PADEP Bureau of Mining Programs

PADEP Bureau of Abandoned Mine Reclamation

PROJECT HIGHLIGHTS:

- Statewide engineering contracts
- AML reclamation plans
- Closure of mine openings
- Mine fire abatement
- Acid mine drainage treatment
- Mine subsidence mitigation
- Water line extension and replacement

In 2012, Tetra Tech was selected for two statewide mining engineering design contracts for the State of Pennsylvania. The contracts were awarded by the Pennsylvania Department of Environmental Protection's (PADEP) Bureau of Mining Programs (BMP) and Bureau of Abandoned Mine Reclamation (BAMR).

Each contract is for a period of five years and work under the contracts will begin in 2012. The scope of services under each covers a wide variety of issues including:

- The development of plans for AML reclamation
- Closure of mine openings
- Control and extinguishment of mine fires
- Abatement or treatment of acid mine drainage water pollution
- Evaluation and rehabilitation of existing passive or active acid mine drainage treatment systems
- Water line extension and replacement
- Mine subsidence
- Water supply







Bandy and King Home Mine Subsidence Mitigation

Norton and Wise, Virginia

CLIENT/CONTACT:

Commonwealth of Virginia Dept. of Mines, Minerals, and Energy

PROJECT HIGHLIGHTS:

- Subsidence stabilization recommendations
- Oversight of drilling activities
- Mapping for each site
- Construction administration services

Tetra Tech was selected to provide mine subsidence mitigation services for the Commonwealth of Virginia's Department of Mines, Minerals & Energy for two residences affected by mine subsidence in Norton and Wise, Virginia.

The reclamation projects included drilling to determine the location of mine voids. Tetra Tech provided a drilling plan, performed drilling oversight at the site, and provided a preliminary engineering report detailing the findings of the drilling program. Tetra Tech made recommendations for the abatement of subsidence in the study area.

Tetra Tech's preliminary engineering report included:

- Subsidence stabilization recommendations including drilling and grouting methods
- Mapping for each site
- Mine dewatering recommendations
- Drilling overview
- Maps, cross-section, and photographs for use in determining preferred abatement/design alternatives



Drilling was performed in the Spring of 2011 to determine the location of mine voids. The drilling plan included a borehole location map for each site, information related to the anticipated depth of each borehole, and a ground control plan for drilling and construction. Field surveying was also provided.



Tetra Tech then made recommendations for the abatement of these subsidence projects and provided construction administration services including the review and evaluation of any substitutions or shop drawings.

"Tetra Tech was very responsive in completing the assigned work. The work was completed on time and within the budget, and I would recommend using Tetra Tech for future abandoned mine land projects."

Randy Casey
Commonwealth of Virginia, Department of Mines, Minerals, and Energy

PADEP Cresson Mine Pool Project

Cresson, Pennsylvania

CLIENT/CONTACT:

PADEP Bureau of Abandoned Mine Reclamation

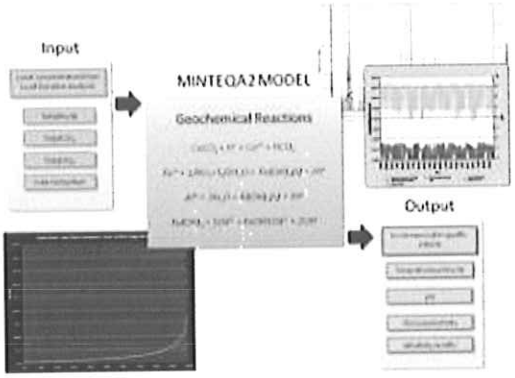
PROJECT HIGHLIGHTS:

- Modeling to evaluate water quality conditions
- Predict in-stream concentrations of water quality components under different pollutant loading conditions

In 2011, Tetra Tech was subcontracted by GAI to perform Abandoned Mine Land remediation for PADEP's Bureau of Abandoned Mine Reclamation project located in Cresson, PA. The project involves the treatment of mine pool water and subsequent discharge into Clearfield Creek for use in agricultural purposes within the watershed. Tetra Tech is responsible for developing a drilling plan, conducting a door-to-door inventory of water users, developing several alternative waste water treatment locations and pipeline configurations, and several other tasks.

Tetra Tech is also developing a load duration curve approach coupled with geochemical simulation using the MINTEQA2 model to evaluate the existing and expected water quality conditions of Clearfield Creek and Sugar Run. The load duration curve approach is a simplified statistical approach for determining pollutant loading capacity by analyzing water quality concentrations and stream flow regimes. It will be used to establish the in-stream and end-of-pipe loading capacities of the water quality components under various pollutant loading conditions.

MINTEQA2 is a geochemical model that can be used to calculate the equilibrium chemical speciation in natural aqueous systems and is useful for calculating the equilibrium mass distribution among dissolved species, adsorbed species, and multiple solid phases under a variety of conditions. The MINTEQA2 geochemical model will be used to predict in-stream concentrations of water quality components (pH, TDS, alkalinity/acidity, total and dissolved Fe/Al) under different pollutant loading conditions resulting from the proposed remedy scenarios.



Bear Run Alkaline Mine Drainage Passive Treatment

Indiana County, Pennsylvania

CLIENT/CONTACT:

Indiana County Conservation District

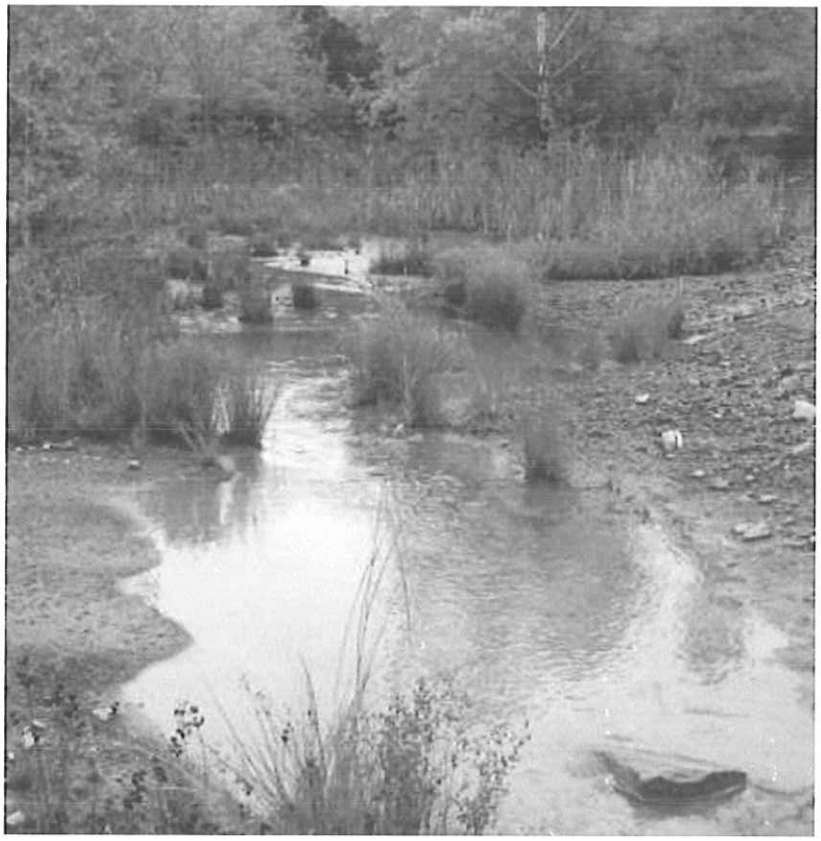
PROJECT HIGHLIGHTS:

- Design incorporated through PADEP Government Financed Construction Contract
- Mine drainage treatment design system
- Computation of stream hydraulics

Tetra Tech was retained by the Indiana County Conservation District for the preparation of a site grading plan and a passive treatment system design for mine drainage that was discharging onto private land and into Bear Run in Indiana County, Pennsylvania. The mine drainage is alkaline, therefore the passive treatment system is designed to aerate and hold the flow in two surface water ponds totaling three acres.

The flow discharges into an existing wetland for polishing and ultimately into Bear Run. The design was incorporated into a Government Financed Construction Contract through PADEP for the removal of coal refuse from the site. Stream hydraulics were computed to reshape an unnamed tributary to Bear Run and to reconstruct a private stream crossing.

The system is fully functional and was constructed in 2010.



PADEP East Avoca – Grove Street Mine Drainage Study

Avoca, Pennsylvania

CLIENT/CONTACT:

Pennsylvania Bureau of Abandoned Mine Reclamation

PROJECT HIGHLIGHTS:

- Mine drainage study
- Investigation to determine the location and depth of abandoned mine workings that may be the source of mine water on residences
- Drilling

Tetra Tech was retained by the Pennsylvania Bureau of Abandoned Mine Reclamation to complete a 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. PADEP, the Bureau of Abandoned Mine Reclamation, and the Office of Surface Mining (OSM) have previously conducted investigations at the site including the review of mine maps and exploratory drilling.

There are four mined coal seams beneath the general vicinity of Avoca Borough, known as the Marcy Bed, Clark Bed, Stark/Top Red Ash Bed, and Bottom Red Ash Bed. PADEP and the OSM have conducted the drilling in 1995, 2000, and 2005 with both rotary and core drilling to determine the depths to the voids, coal seam elevations, and water elevations, if found.

Tetra Tech's investigation will determine the location and depth of abandoned mine workings that may be the source of mine water occasionally noted along Grove Street. This investigation will also determine whether or not the source of surface water reaching the underground mine workings originates at the storm water basin that serves the Wilkes-Barre/Scranton International Airport or if it originates from another location. Tetra Tech will then propose alternative solutions to abate the drainage problem.

Tetra Tech's services will include:

- Drilling preparation
- Mine mapping
- Review of PADEP and OSM past investigations
- Right of Entry agreements
- Drilling
- Field investigations
- Monitoring during heavy rains
- Surface and mine flow diagrams
- Study of mine pool interaction with surface/subsurface flows
- Report and recommendations

The project is expected to be completed in June 2013.

Gladden Acid Mine Discharge Mitigation and Stream Sealing

South Fayette Township, Pennsylvania

CLIENT/CONTACT:

South Fayette Conservation Group

PROJECT HIGHLIGHTS:

- PADEP BAMR coordination
- AMD treatment design
- Unstable highwall
- Stream sealing
- Highway, railroad, and property owner considerations
- Surveying and mapping

The South Fayette Conservation Group, in conjunction with the PADEP Bureau of Abandoned Mine Reclamation, retained Tetra Tech to design a passive AMD treatment system. Millers Run, a warm water fishery, flows into Chartiers Creek, also a warm water fishery. The abandoned mine portal discharges approximately 1,000 gpm of AMD into Millers Run. With the aeration and mixing of the flow, the pH rises and the iron oxide is precipitated out of the flow, resulting in several miles of iron oxide precipitation and low oxygenated water. Tetra Tech surveyed the site and prepared a topographic map, installed monitoring wells to monitor the mine pool elevation, delineated wetlands, and evaluated several alternative site configurations. One site evaluated had an unstable highwall. Tetra Tech conducted a geotechnical evaluation, performing a hydrologic evaluation of the floodplain, and prepared the site layout and grading plan design. Tetra Tech prepared construction drawings, specifications, construction cost estimates and PADEP permits.

The design consisted of the excavation of a 3-acre basin on private property adjacent to a four-lane highway, railroad right-of-way, and an adjacent property owner. Treatment will consist of a directional bore into the mine to allow gravity flow of the drainage into a limestone bed and into the basin. The basin area will be over-excavated to remove the underlying coal bed and will be constructed at a horizontal distance far enough away from the existing mine to prevent a blowout. Existing discharge will remain behind a small check dam but will be used as an outlet control if the mine pool rises. The basin will consist of three cells to increase holding time and allow for each cell to be isolated for the removal of iron oxide for commercial use. The basin will discharge through a riser structure into man-made wetland areas for additional treatment prior to flowing into Millers Run and Chartiers Creek. In 2009, the client applied for a PADEP Growing Greener Grant to fund the investigation, design, and construction of a stream flow loss mitigation project. In order to build the project, flow into the mine needed to be reduced because sufficient property could not be acquired. By reducing the flow into the mine the design size could be decreased in size and the acquired property would be enough to install a system to handle the mine discharge. Weirs and continuous water level monitors were installed at the top and bottom of the stream channels. Data collected from the monitors was used to determine stream flows and flow loss. A design is underway to use Fabriform liner and grouting techniques to reduce flow into the mine.



"I would recommend both Tom (Gray) and Tetra Tech to anyone considering undertaking an AMD project."

Amy Smith
President, South Fayette Conservation Group

Ohio Valley Coal Company Mine Seal Design

Alledonia, Ohio

CLIENT/CONTACT:

Ohio Valley Coal Company

PROJECT HIGHLIGHTS:

- Design of two hydraulic mine seals
- Study of mine seal and bulkheads
- Coordination with MSHA and NIOSH officials

Tetra Tech was contracted by the Ohio Valley Coal Company to design two hydraulic mine seals at the Ohio Valley #6 Mine near Alledonia, OH. The internal bulkheads were designed for a minimum permanent static head of water of 90 feet and to have a safety factor of 2.0. Two seal designs were evaluated: one, which is keyed into the roof, floor and ribs; and a second non-keyed in design, which functions structurally by gravity and friction. A borehole was also specified to use as a conveyance for the grout to construct the seals.

Tetra Tech was then retained by the company to perform a detailed study of mine seal and bulkhead successes and failures to assist in the design. The research included an analysis of reasons for failures of mine bulkheads as well as an analysis of the number of approved versus unapproved designs.

Individuals at both MSHA and NIOSH were contacted to provide insight into mine bulkhead design. A review of available literature on mine bulkhead design was also performed and summarized as part of the project.