



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

Solicitation

NUMBER
DEP16435

PAGE
1

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

RFQ COPY

TYPE NAME/ADDRESS HERE

VENDOR

TETRA TECH, Inc.
 661 ANDERSON 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
12/03/2013

BID OPENING DATE: 01/02/2014

BID OPENING TIME 1:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		906-29		
MORGANTOWN AIRPORT SUBSIDENCE II 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 MORGANTOWN AIRPORT SUBS II IN MONONGALIA COUNTY, WEST VIRGINIA PER THE FOLLOWING BID REQUIREMENTS AND ATTACHED SPECIFICATIONS.						
12/26/13 09:42:26AM West Virginia Purchasing Division						
***** THIS IS THE END OF RFQ DEP16435 ***** TOTAL:						

SIGNATURE <i>Thomas A. Dancy</i>	TELEPHONE (412) 921-8794	DATE 12/24/13
TITLE ENERGY/NATURAL RESOURCES MGR. <i>95-4148514</i>	ADDRESS CHANGES TO BE NOTED ABOVE	

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



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December 24, 2013

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

Dear Mr. Whittaker:

Tetra Tech is pleased to submit our qualifications to perform design services in reply to RFQ #DEP16435 for the State of West Virginia. As outlined in our proposal, Tetra Tech and its personnel have completed work on **thousands of mine reclamation projects**. These projects have included mine subsidence assessment and design work.

This project will be managed out of Tetra Tech's Pittsburgh, Pennsylvania area offices, led by our Fairmont, WV office. Tetra Tech has a total of **six AML design teams** (a team consisting of one West Virginia registered engineer and one CAD professional) and **seven West Virginia registered Professional Engineers** in these offices. Tetra Tech also has more than 650 mining and civil engineers, and 170 CAD professionals companywide that are available to support this work if needed.

Our experienced team is led by Mr. Ronald Lane, PE. Mr. Lane has more than 16 years of mining and AML experience and was previously the manager of WVDEP's AML&R Emergency Response program. He will be joined by our technical advisor, Mr. Thomas Gray, PE, and our senior engineer, Mr. Gregory Hynes, PE, as well as the rest of our project team. Mr. Gray and Mr. Hynes have managed or supported more than 40 AML projects for the WVDEP and both have experience with mine subsidence projects. Most recently, Mr. Gray managed two subsidence projects for the Virginia DMME and Mr. Hynes managed two WVDEP subsidence projects – the MacArthur Mine Subsidence Project and the Kayford Mountain Subsidence Investigation. All three (Mr. Lane, Mr. Gray, and Mr. Hynes) are registered Professional Engineers in the State of West Virginia.

Tetra Tech as a firm also has significant experience working for the WVDEP. Mr. Gray recently managed three AML projects for the WVDEP – the Fisher Run, Tunnelton, and the Paint Branch Mine Portal Closure Design projects. Tetra Tech is also currently managing the AML&R's Parker Run Design Project and the OSR's Energy Marketing Slurry Impoundment Project. In addition, our Charleston office is currently managing TMDL projects for the WVDEP.

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 Mr. Lane at (304) 534-4021.

Sincerely,

Mr. Ronald Lane, PE
Project Manager

Mr. Thomas Gray, PE
Energy and Natural Resources Manager



Section B: Consultant Questionnaire

**WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
AML CONSULTANT QUALIFICATION QUESTIONNAIRE**

Attachment "B"

PROJECT NAME Morgantown Airport Subsidence II Design	DATE (DAY, MONTH, YEAR) 24, December, 2013	FEIN 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 / Thomas Gray, PE / (16 AML design personnel - 10 Design Engineers and 6 CADD Professionals)		
8. PRINCIPAL OFFICERS OR MEMBERS OF FIRM Mr. Ronald Lane, PE – Fairmont AML Manager Mr. Thomas Gray, PE – Pittsburgh AML Manager		8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS
9. PERSONNEL BY DISCIPLINE		
? ADMINISTRATIVE ARCHITECTS 300 BIOLOGIST 170 CADD OPERATORS 304 CHEMICAL ENGINEERS 588 CIVIL ENGINEERS 61 CONSTRUCTION INSPECTORS _ DESIGNERS (counted in CADD) _ DRAFTSMEN (counted in CADD)	152 ECOLOGISTS 138 ECONOMISTS 60 ELECTRICAL ENGINEERS 746 ENVIRONMENTALISTS 271 ESTIMATORS 367 GEOLOGISTS 3 HISTORIANS 115 HYDROLOGISTS	19 LANDSCAPE ARCHITECTS 54 MECHANICAL ENGINEERS 70 MINING ENGINEERS 12 PHOTOGRAMMETRISTS 96 PLANNERS: URBAN/REGIONAL 70 SANITARY ENGINEERS 34 SOILS ENGINEERS 140 SPECIFICATION WRITERS
		98 STRUCTURAL ENGINEERS 60 SURVEYORS 75 TRAFFIC ENGINEERS 7855 OTHER 239 TOTAL PERSONNEL (IN PRIMARY OFFICE) 14,000+ Personnel company-wide
TOTAL NUMBER OF WV REGISTERED PROFESSIONAL ENGINEERS IN PRIMARY OFFICE: 7 *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? <input type="checkbox"/> YES <input type="checkbox"/> NO N/A		

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

<p>NAME AND ADDRESS: Test Boring Services, Inc. 140 Mong Road Scenery Hill, PA 15360</p>	<p>SPECIALTY: Drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes (with individual staff) <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Sturm Environmental Services P.O. Box 650 Bridgeport, WV 26330</p>	<p>SPECIALTY: Laboratory analysis (coal, soil, water)</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes (with individual staff) <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Double J Drilling 1207 Williamstown Pike Williamstown, WV 26187</p>	<p>SPECIALTY: Drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Blue Mountain Aerial Mapping 23 Mason-Dixon Highway ,on, WV 26562</p>	<p>SPECIALTY: Aerial mapping</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Industrial Lab Analysis 65 36th Street Wheeling, WV 26003</p>	<p>SPECIALTY: Laboratory Analysis (water)</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes (with individual staff) <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Test Boring Services, Inc. 140 Mong Road Scenery Hill, PA 15360</p>	<p>SPECIALTY: Drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes (with individual staff) <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: Terra Testing, Inc. 260 Meadowlands Blvd. Washington, PA 15301</p>	<p>SPECIALTY: Geotechnical drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS: TRIAD Engineering 219 Hartman Run Road Morgantown, WV 26505</p>	<p>SPECIALTY: Surveying, Drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>

<p>12. A. Are your firm's personnel experienced in Abandoned Mine Lands Remediation/Mine Reclamation Engineering?</p> <p>YES <u>Description and Number of Projects:</u> Tetra Tech and its consultants have completed over 300 abandoned mine land projects - Attachment C is only a partial listing. Our Project Manager, Ronald Lane, PE, previously managed the AML program for the WVDEP. He has done preliminary data gathering on the Morgantown Airport site and is extremely familiar with the project area. Our Technical Advisor, Mr. Thomas Gray, PE, has managed and supported AML projects for 26 years and has previously managed WVDEP projects. Our Senior Engineer, Gregory Hynes, PE, has been working on abandoned mine reclamation projects for the past 20 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.</p>
<p>B. Are your firm's personnel experienced in Soil Analysis?</p> <p>YES <u>Description and Number of Projects:</u> 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.</p>
<p>C. Are your firm's personnel experienced in hydrology and hydraulics?</p> <p>YES <u>Description and Number of Projects:</u> 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.</p>
<p>D. Does your firm produce its own Aerial Photography and Develop Contour Mapping?</p> <p>YES <u>Description and Number of Projects:</u> 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.</p>
<p>E. Are your firm's personnel experienced in domestic waterline design? (Include any experience in evaluation of aquifer degradation as a result of mining.)</p> <p>YES <u>Description and Number of Projects:</u> Our senior engineer, 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.</p>
<p>F. Are your firm's personnel experienced in Acid Mine Drainage Evaluation and Abatement Design?</p> <p>YES <u>Description and Number of Projects:</u> 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 technical advisor, Mr. Thomas Gray, PE, 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.</p>

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:
Lane, Ronald, PE Project Manager	8	16	0
Brief Explanation of Responsibilities			
Mr. Lane has more than 30 years of mining experience and is a technical expert in mine subsidence, mining engineering, mine reclamation, and other mining-related issues. He previously served as the program manager for the WVDEP's AML&R emergency response program and is Tetra Tech's AML manager in their Fairmont, West Virginia office. Mr. Lane specializes in the reclamation of abandoned mine sites and currently is supporting Tetra Tech's Parker Run Design project for the WDEP AML&R. His project management responsibility has included construction, engineering, and regulatory compliance development. He has been responsible for the successful completion of a wide variety of abandoned mine reclamation projects and has provided oversight of design documents as project manager to mitigate mine subsidence potential over an extensive area which included 120 residential structures. His experience has also included the preparation of construction plans and specifications in addition to construction oversight as program manager for AML&R's emergency program.			
EDUCATION (Degree, Year, Specialization)			
BS, 1983, Mining Engineering			
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS		REGISTRATION (Type, Year, State)	
N/A		Professional Engineer, 2009, West Virginia	

14. 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 Technical Advisor	27	39	21
Brief Explanation of Responsibilities			
Mr. Gray has more than 39 years of mining engineering experience and has managed and supported numerous subsidence projects including the Virginia DMME's Bandy and King subsidence investigations, the Bureau of Mines' Streyer Run Subsidence Assessment, and subsidence projects for private clients in West Virginia, Maryland, and Pennsylvania. In addition, he also has managed and supported seven AML projects for the WVDEP and is currently working on two projects for the agency – the Parker Run Design project for the AML&R division and the Energy Marketing Company Slurry Impoundment Permit Project for the OSR. 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: 26
Hynes, Gregory, P., PE Senior Engineer	22	22	

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

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
Byle, Michael, PE Subsidence Engineer	31	31	

Brief Explanation of Responsibilities

Mr. Byle has more than 31 years of professional experience in geotechnical engineering and mine subsidence projects. He also has extensive experience in geotechnical grouting including grouted anchors in rock and for structural rehabilitation, as well as investigation and rehabilitation of structures and foundations, soil improvement techniques, exploration and mitigation design for karst, and project management and construction oversight for complex specialty geotechnical projects. Specific technical experience includes evaluation and stabilization of soft sediments, dredged materials, grouting and grouting design, and applications of engineering geophysics.

EDUCATION (Degree, Year, Specialization)
 MS, 1978, Civil Engineering
 BS, 1971, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS	REGISTRATION (Type, Year, State)
International Society of Soil Mechanics and Foundation Engineers American Society of Civil Engineers Academy of Geo-Professionals – Diplomate Geotechnical Engineering	Professional Engineer, 1992, Pennsylvania Professional Engineer, 1990, Maryland Professional Engineer, 1989, Virginia Professional Engineer, 1993, Delaware Professional Engineer, 2008, New York Professional Engineer in five other states including NJ, CO, MN, FL, & NH

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.) Yanero, David, L. Environmental Engineer	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 20	YEARS OF AML RELATED DESIGN EXPERIENCE: 20	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
Brief Explanation of Responsibilities Mr. Yanero has more than 20 years of abandoned mine land and engineering experience. He has supported numerous abandoned mine land design projects in West Virginia and other nearby states including Maryland, Pennsylvania, and Ohio. His work has included subsidence investigations, the design of drainage structures, regrading and stabilization plans, pre-blast investigations, permitting, mapping, and computer drafting using AutoCAD. Currently, he is supporting Tetra Tech's work with the WVDEP for the Parker Run Design Project.			
EDUCATION (Degree, Year, Specialization) AS, Architectural Design			
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS N/A		REGISTRATION (Type, Year, State) 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.) Verma, Pete, PE Geotechnical Engineer	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 5	YEARS OF AML RELATED DESIGN EXPERIENCE: 33	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
Brief Explanation of Responsibilities Mr. Verma has more than 33 years of mining, geotechnical, and civil engineering experience. His mining subsidence experience includes serving as a design engineer for various subsidence remediation projects in West Virginia and Ohio. These projects, along with coal refuse and spoil pile remediation, bridge abutment, and dam projects involved subsurface investigations, field testing, grading plans, hydrogeological analysis, and construction drawings and specifications. Mr. Verma also developed computer software based on the National Coal Board's model for the prediction of subsidence as a part of several mine permitting projects.			
EDUCATION (Degree, Year, Specialization) MS, 1980, Mining Engineering MS, 1994, Civil Engineering BS, 1976, Integrated Engineering and Mining Engineering			
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS American Society of Civil Engineers International Society for Soil Mechanics and Geotechnical Engineers		REGISTRATION (Type, Year, State) Professional Engineer, Pennsylvania Professional Engineer, Maryland Professional Engineer, 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:
Coffman, James, D. Geophysicist	2	16	0

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 mine subsidence 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

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:
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 experience. In addition to studying impacts created by subsidence, her 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 also currently serves as a lead on two statewide abandoned mine land reclamation contracts with PADEP.

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, 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.) Kramer, Carly, N. CAD Designer	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 5	YEARS OF AML RELATED DESIGN EXPERIENCE: 7	YEARS OF DOMESTIC WATERLINE EXPERIENCE: 0
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 including Tetra Tech's Majorsville Pipeline Subsidence Project. 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	

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.) Najeski, Nichole CAD Designer	YEARS OF EXPERIENCE		
	YEARS OF AML DESIGN EXPERIENCE: 4	YEARS OF AML RELATED DESIGN EXPERIENCE: 4	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
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 including Tetra Tech's Bandy and King Mine Subsidence Projects for the Virginia Department of Mines, Minerals, and Energy. 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	

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 and Acrobat Version 9.0

Carlson

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
WVDEP Parker Run Design Project, West Virginia	WVDEP AML&R 601 57 th Street Charleston, WV 25304	Prime Contractor – Design	Not yet known	20%
WVDEP OSR Energy Marketing Impoundment Design, West Virginia	WVDEP OSR 601 57 th Street Charleston, WV 25304	Prime Contractor – Design	Not yet known	50%
WVDEP 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	40%
WVDEP 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	70%
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	20%
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	20%
PADEP East Avoca-Grove Street Mine Drainage Study, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	Management of mine drainage control project	Not yet known	80%
TOTAL NUMBER OF PROJECTS: 10 (Tetra Tech is currently conducting thousands of projects nationwide – for the purpose of this EO1, only a sample of our most recent mining projects for state entities are shown)		TOTAL ESTIMATED CONSTRUCTION COSTS: Not yet known – currently in design phases		

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
PADEP Palo Alto Mine Drainage Design, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	Management of mine drainage control project	Not yet known	80%
PADEP Blacklick Creek Treatment Facility Design, Pennsylvania	PADEP Bureau of Abandoned Mine Reclamation 400 Market Street Harrisburg, PA 17105	Management of mine pool treatment design project	Not yet known	0% (awarded in December 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	75%
Wyoming Abandoned Mine's Statewide Subsidence Harms Mitigation Contract, Wyoming	Wyoming Department of Environmental Quality, AML Division 122 W. 25 th Street Cheyenne, WY 82002	Statewide program management of subsidence mitigation	Not yet known	30%
Colorado Division of Reclamation, Mining, and Safety Mine Fire Abatement Management, Colorado	Colorado DRMS 1313 Sherman Street #423 Denver, CO 80203	Statewide mine fire abatement management	Not yet known	0% (awarded in December 2013)
TOTAL NUMBER OF PROJECTS: 12 (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 Not yet known – currently in design phases	

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)
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
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
DEP 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

Tetra Tech has 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
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
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
DOH 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
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

Tetra Tech has 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)
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
ALCOSAN Grand View Golf Course Mine Drainage Treatment System, Pennsylvania	ALCOSAN 3300 Preble Avenue Pittsburgh, PA 15233	N/A	2011	N/A
Mine Air Shaft Closure Design, Ohio	Ohio Valley Coal Company 34 Kelley Way, Suite 100 Brilliant, OH 43913	N/A	2009	Yes
Coal Property Due Diligence Evaluation, Pennsylvania	Confidential client	N/A	2011	N/A
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

Tetra Tech has 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)
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
Quecreek Deep Mine Expansion Permitting, Pennsylvania	PBS Coals, Inc. 1576 Stoystown Road Friedens, PA 15541	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
Reserves Investigation and Due Diligence Study, Pennsylvania	PBS Coals, Inc. 1576 Stoystown Road Friedens, PA 15541	N/A	2011	N/A

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

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
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 for State agencies					

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: Energy and Natural Resources Manager

Date: December 24, 2013

Printed Name: Thomas Gray, PE



Section C: 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	Ronald Lane, PE	Thomas Gray, PE	Gregory Hynes, PE	Pete Verma, PE	Other Project Team Personnel	Other Tetra Tech Personnel		
			TETRA TECH FEATURED PROJECTS																						
Bandy and King Home Mine Subsidence Mitigation	C & P	E		X					X	X						X				M		P	P		
Majorsville Pipeline Alignment Subsidence Study	C & P	E							X							X				P		P	P		
Marjol Plant RFI and Mine Subsidence Evaluation	C & P	E		X		X			X			X				X				P			P		
ODOT Highway 33 Subsidence Mitigation	C & P	E		X					X							X							P		
Wyoming AML Statewide Subsidence Contract	C & P	E							X														M		
West Elk Subsidence Project	C & P	E	X				X		X		X				X	X				P			M		
IHI Mine Fire and Subsidence Evaluation	C & P	E	X					X	X														P		
WVDEP Paint Branch Mine Portals Design	C & P	E		X	X					X										P		M	P		
WVDEP TMDL Development	C & P	E	X	X		X	X				X		X		X								M	P	
WVDEP Parker Run Design	C & P	E	X							X		X				X				P	P	M	P	M	
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	
PADEP Statewide Mining Design Contracts	C & P	E	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		P	M	P	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			
SENIOR ENGINEER'S (GREGORY HYNES, PE) ADDITIONAL WVDEP EXPERIENCE																					
WVDEP MacArthur Mine Subsidence	P	D		X	X			X	X						X	P					
WVDEP Recommendations to Ameliorate Subsidence	P	D						X							X	P					
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 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 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					
* 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.																					

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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	

SENIOR ENGINEER'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				
EP 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				

* 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		

SENIOR ENGINEER'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, Valls creek Study	P	D								X	X					P				

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

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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	

TECHNICAL 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	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			
WVDEP OSR Energy Marketing Impoundment	P	D																X			P			

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 ** 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	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	M
Jonathan Run AMD Treatment Design	C & P					X				X			X							M				P
Quecreek Deep Mine Expansion	C & P					X				X		X			X					M		P	P	P
orest 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
Gladden AMD Mitigation/Stream Sealing	C & P		X	X	X	X				X	X	X		X	X	X				M		P	P	P
PADEP Cresson Mine Pool Project	C & P					X				X	X		X							M		P	P	P
Bear Run Alkaline Mine Drainage Passive Treatment	C & P		X			X				X	X	X	X	X	X					M				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
* 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.																								

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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																								
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
* 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.																								



Section D: Resumes



RONALD LANE, PE

Engineer

Mr. Lane has more than 16 years of professional experience. He is a technical expert in mining engineering, subsidence, mine reclamation, mine stabilization, and acid mine drainage remediation. Mr. Lane specializes in the reclamation of abandoned mine sites and is the former manager of WVDEP AML&R's emergency response program. His project management responsibility has included construction, engineering, and regulatory compliance development. He has been responsible for the successful completion of a wide variety of abandoned mine reclamation projects, including the oversight of design documents as project manager to mitigate mine subsidence potential over an extensive area which included 120 residential structures.

EDUCATION
BS, Mining Engineering
REGISTRATIONS
Professional Engineer: WV
YEARS EXPERIENCE
16

Emergency Engineer and Emergency Program Administrator; Multiple Subsidence and Ground Stabilization Projects; WVDEP; Various Counties, WV. Work consisted of injection grouting to provide ground stabilization to mitigate the impact of subsidence on residential and commercial structures. As the AML Emergency Engineer, Mr. Lane administered the projects from the initial site investigation through completion of construction. Conducted exploratory drilling to determine the extent and depth of the underground mine workings, the integrity and characteristics of the overburden and immediate mine roof, and targets for the vertical and angled injection holes. The surveying involved the creation of an existing conditions map which included existing utilities, contours, borehole locations, and to obtain further detail near the structures for rig access during the grouting phase of the various projects. The quantity and type of grout required for ground stabilization for each structure was estimated based on the results of the exploratory drilling. Prepared the plans, specifications, and bidding documents in addition to conducting all meetings for over ten ground stabilization projects.

Project Manager; Fairmont (Jackson Addition) Subsidence Abatement Project; WVDEP; Marion County, WV. Work consisted of exploratory drilling to determine the extent and depth of the underground mine workings, the integrity and characteristics of the overburden and immediate mine roof, targets for the vertical and angled injection holes in addition to the batch plant locations. Mr. Lane coordinated the drilling and surveying of the site. The surveying involved the creation of an existing conditions map which included existing utilities, contours, borehole locations, and to obtain further detail near the structures for rig access during the grouting phase. Mr. Lane completed the drilling investigation plan by selecting locations for exploratory drilling based on physical observations and the thickness of the overburden above the suspected underground mine workings that are located in the Pittsburgh Seam. The quantity and type of grout required for ground stabilization for each structure was estimated based on the results of the exploratory drilling. The project will involve the drilling of 620 vertical and angled injection holes to provide ground stabilization via injection grouting for 123 residential structures.

Project Manager; Ridenour Highwall/Subsidence Project; WVDEP; Monongalia County, WV. Project design involved elimination of linear subsidence features located above the crown of the highwall, reducing



the highwall to a stable configuration by backfilling with available on-site spoil, entombment of refuse, drainage control structures, E&S controls and permitting.

Project Manager; Highwall Elimination Project; WVDEP; Barbour County, WV. Scope of work consisted of the elimination approximately 5,000 lf of hazardous highwalls at four different sites, wetland delineation, installation of surface and subsurface drainage control structures, reclamation of coal refuse piles, mapping of the site, determination of borehole locations to gather geotechnical information for refuse and highwall reclamation, water sampling and testing, relocation of gas lines, E&S controls and permitting. Due to the close proximity of occupied dwellings at the toe of one highwall, the method proposed for stabilization was the utilization of soil nails and rock anchors. The remaining highwalls were to be eliminated by utilizing the available on-site spoil to backfill the highwall to a stable configuration.

Project Manager; Hilderbrand Highwall Project; WVDEP; Monongalia County, WV. Project design involved reducing the highwall to a stable configuration by backfilling with on-site spoil, installation of wet/modified mine seals, drilling to locate the underground mine workings and determine the head and water chemistry, installation of open limestone channels to treat the acid mine drainage, testing of impounded water to determine PH and water chemistry, installation of subsurface drains, soil testing to determine nutrient requirements to establish vegetation, stream bank stabilization, E&S controls and permitting.

Construction Engineer; Peninsula Highwall #1 and #2; WVDEP; Monongalia County, WV. Mr. Lane served as the Construction Engineer and supervised and coordinated the work of the Construction Inspectors during the construction phase of the project. The construction of the project consisted of the reclamation of two highwalls, installation off one dry mine seal and one batgate type wet mine seal, installation of surface and subsurface drainage control structures, dewatering and treatment of impounded mine drainage, access roads and pavement repair, soil cover and placement, erosion and sediment controls, and revegetation.

Emergency Engineer and Administrator; Laurel Valley (Daniels) Landslide; WVDEP; Harrison County, WV. Mr. Lane managed the design and construction of the project from inception to completion. The project was comprised of two phases. The first phased involved the removal of approximately 0.5 acres of loose, unconsolidated spoil that had slipped and toed out against the basement wall of a residential structure. The lateral stresses induced by the slip material had caused significant lateral movement of the wall. Acid mine drainage was observed emanating at several locations within the slip material. Drainage controls were constructed to convey the acid mine drainage that had contributed to the slope instability away from the slip area. The slip area was stabilized by removing the slip material and regrading the site to a stable configuration. The second phase of the project involved the reclamation of approximately 460 Lf of highwall utilizing the material excavated from the slip area. The two phases of project also included the design and construction of open limestone channels, vegetated channels, installation of pipes and associated appurtenances, site preparation, slope stability calculations, soils and grout testing, concrete road repair, development of quantity estimate and construction cost estimate, initial site investigation to determine eligibility, erosion and sediment controls, and revegetation of disturbed areas.



THOMAS GRAY, PE
Project Advisor / Quality Control

Mr. Gray has more than 39 years of professional experience. He is a technical expert in subsidence, 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.

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

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

Project Manager; Omega Mine Grouting Project to Reduce Subsidence Potential; WVDEP; Monongalia County, WV. This project injected coal combustion byproduct based grout into 25 acres of abandoned mine workings to reduce the generation of AMD and to reduce subsidence potential. Responsible for research and development investigation, construction plans and specifications, monitoring construction, and preparing a research report. Project sponsors included Allegheny Energy, DOE, Consol, and the Electric Power Research Institute.

Project Manager; 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. After the drilling, a report was written that included recommendations for addressing the subsidence features.

Project Manager; Mine Subsidence Investigation; Mettiki Coal Company; Western MD. Managed a mine subsidence investigation to determine the feasibility of mining four entries under the North Branch of the Potomac River. In addition, an evaluation was performed to predict impacts to a small native trout stream from longwall mining. Both projects were approved by regulatory agencies and successfully completed.

Project Manager; Dominion Resources Coal Fired Power Plant Siting Investigation; Dominion Resources; St Paul, VA. Performed a siting investigation to determine best location for a new coal fired



power plant in Southwestern VA. A regulatory fatal flaw analysis was performed on potential solid waste disposal sites. Preliminary designs and permit documents were prepared, including a hydrogeologic investigation and development of a mine grouting plan to stabilize the embankment.

Senior Consultant; Mine Seal Construction Research; NIOSH; Fayette County, PA. Supported this 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; Alkaline Coal Ash Injection; CTC; 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; 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.

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

Project Engineer; Preliminary Subsidence Assessment; Capels Resources (Subsidiary to Berwind Corporation); McDowell County, WV. Preliminary subsidence assessment project for underground coal mining property being proposed as a sanitary landfill.

Senior Project Manager; Longwall Mining Subsidence; Consol Energy; Greene County, PA. Evaluated longwall mining subsidence and impacts to surface structures.

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

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.

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; Galbraith Landslide Abatement/Geotechnical Investigation; OSM; Allegany County, MD. Managed geotechnical investigation to gather the required site information to design landslide abatement measures for a 140-ft. wide landslide uphill from a residence. The investigation involved drilling, testing, and surveying to characterize the site, and design abatement measures to stabilize the landslide.

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. Mr. Gray managed the previous version of this contract as well, that began in 2007.

PUBLICATIONS

- 2004 Gray, T.A., Crayne, L.M., Trevits, M.A., Glogowski, P.E. "Demonstration of Remote Mine Seal Construction" presented at the Annual SME Meeting, Denver, Colorado, February 23-25, 2004.
- 2002 Gray, T.A. and Gray, R.E. "Omega Mine Injection Projects" presented at the PA Conference on Abandoned Mine Reclamation, June 15, 2002, State College, PA.
- 1998 Gray, T. A., Moran, T. C., Broschart, D., and Smith, G. "Injection of Coal Combustion By-Products into the Omega Mine for the Reduction of Acid Mine Drainage." Presented at the Pittsburgh Coal Conference in Pittsburgh, PA, September 15, 1998.
- 1997 Kyper, T. N., Snodgrass, J., and Gray, T. A. "Disposal of Coal Combustion By-Products in Underground Coal Mines." Published in the University of Kentucky Center for Applied Energy Research bimonthly newsletter, Energeia.
- 1991 Gray, T. A., Bruhn, R. W., Luxbacher, G. W., and Ferrell, J. R. "The Structural Response of a Steel Lattice Transmission Tower to Mining-Related Ground Movements." Presented at the 10th International Conference on Ground Control in Mining, Morgantown, WV, June 10-12, 1991.
- 1992 Gray, T. A., and Gray, R. E. "Mine Closure, Sealing, and Abandonment." In SME Mining Engineering Handbook, 2nd ed., edited by H. L. Hartman. Society for Mining, Metallurgy, & Exploration, 1992.



GREGORY HYNES, PE
Senior Engineer

Mr. Hynes has more than 26 years of experience in abandoned mine land reclamation, subsidence mitigation, 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.

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

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; 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. 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; Cadiz Streets II Subsidence 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 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 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; 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.



MICHAEL BYLE, PE

Subsidence Engineer

Mr. Byle has more than 31 years of professional experience in geotechnical engineering and mine subsidence projects. He also has extensive experience in geotechnical grouting including grouted anchors in rock and for structural rehabilitation, as well as investigation and rehabilitation of structures and foundations, soil improvement techniques, exploration and mitigation design for karst, and project management and construction oversight for complex specialty geotechnical projects.

EDUCATION
MS, Civil Engineering
BS, Civil Engineering
REGISTRATIONS
Professional Engineer: PA, VA, MD, NJ, DE, NY, NH, FL, MN, CO
YEARS EXPERIENCE
31

Project Manager; U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, Bills/Keefe Mine Subsidence; Cambria County, PA. Responsible for the remedial design to arrest subsidence of two dwellings into an abandoned mine drift located between the two houses and about 45 feet below the ground surface. The remediation consisted of creating check dams of stiff concrete within the mine drift and filling the drift between them with a low-strength grout. Densified the disturbed soils above the drift with compaction grouting and prepared the design and specifications for this work and provided construction-phase consultation.

Geotechnical Engineer; I-81 Mine Subsidence Investigation; PennDOT District 4-0; Luzerne County, PA. Performed mine subsidence and geotechnical investigation for rehabilitation of an existing interchange and construction of a proposed new roadway for this site in the Northern Anthracite Coal region. Directed research and analysis of mining maps, reports, and historical information concerning surface and subsurface coal mining in the area. Completed geotechnical exploration for roadways and structures and developed foundations to support proposed structures and mitigate effects of previous mining.

Project Manager; Mine Subsidence Evaluation; Aspen, CO. Performed geologic, slope stability, and mine subsidence evaluation for a hotel at the base of Aspen Mountain. Project involved evaluation of mine waste slopes stability, mine map interpretation, and evaluation of subsidence potential due to abandoned 19th century silver mines, as well as geologic hazard evaluation and design of stabilization measures.

Geotechnical Engineer; Geotechnical Exploration with Mine Spoils; Glenrock, WY. Mine spoils up to 107 feet deep were revealed in the geotechnical exploration of a reclaimed strip area for Glenrock and Rolling Hills Wind Farms. Directed investigations and design of foundations including dynamic compaction of mine spoils at 13 wind turbine sites where mine spoils were less than 40 feet deep, and drilled/grouted micro-piles and H-piles for 16 sites where deeper mine spoils would make dynamic compaction impractical.

Geotechnical Manager; S.R. 0202, Section 400 Geotechnical Investigations; PennDOT District 6-0; Chester/Montgomery Counties, PA. Managed geotechnical investigations for improvements to the existing U.S. Route 202 that involved widening and interchange modifications and a new two-span railroad truss bridge. The project included subsurface investigation and design recommendations for support of 11 bridges, 25 retaining walls, and sound barrier walls in karst limestone.



PETE VERMA, PE

Mining/Geotechnical Engineer

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 geotechnical engineering, slurry walls, MSE, walls, surface water hydrology, hydrogeological analysis, civil and concrete design, subsurface investigation, foundations design, retaining walls, sheet pile 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; Development of Mine Subsidence Software; National Coal Board. Developed computer software based on National Coal Board's model for the prediction of subsidence as a part of several mine permitting projects.

Geotechnical Engineer; Monterrey Coal Company Mine Reclamation; ExxonMobil Corporation; Southern IL. Performed design analysis for the installation of two-ft 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.

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.

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.

EDUCATION

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

REGISTRATIONS

Professional Engineer: PA, MD, VA

YEARS EXPERIENCE

33



DAVID YANERO

Project Designer

Mr. Yanero has more than 20 years of abandoned mine land and engineering experience. He has supported numerous abandoned mine land design projects in West Virginia and other nearby states including Maryland, Pennsylvania, and Ohio. His work has included subsidence investigations, the design of drainage structures, regrading and stabilization plans, pre-blast investigations, permitting, mapping, and computer drafting using AutoCAD.

EDUCATION
AS, Architectural Design
REGISTRATIONS
N/A
YEARS EXPERIENCE
20

Project Designer; Abandoned Mine Land Design including Subsidence Investigations; Various Clients; WV, MD, PA, and OH. Mr. Yanero has provided several design services for various AML projects in West Virginia, Maryland, Pennsylvania, and Ohio. His work has included subsidence investigations, regrading and stabilization plans, design of drainage structures, pre-blast investigations, erosion and sediment control plans, stormwater pans, permitting, and mapping.

Environmental Technician/Land Agent; Subsidence Investigation, Permitting, and Design; Consolidation Coal Company; Various Locations. Mr. Yanero assisted in the preparation of state and federal mine permits related to deep mine development. His work also included subsidence investigations, the design of surface facilities, shaft sites, roads, sediment and drainage structures, acid mine drainage treatment facilities, NPDES, and pre-blast surveys.

Project Designer; Parker Run Design Project; WVDEP; Marion County, WV. Mr. Yanero is currently supporting Tetra Tech's abandoned mine land design work for the Parker Run Project involving four sites located in Marion County, West Virginia. The project is ongoing and includes the design of drainage conveyances, design installation of mine seals, highwall reclamation, design of refuse reclamation, design of stream bank stabilization, the design of structural demolition and trash removal/disposal, and the revegetation of disturbed areas.

Project Designer; Acid Mine Drainage Treatment Design; Pennsylvania Department of Environmental Protection; Cresson, PA. Providing CAD design services for the design for the Cresson acid mine drainage treatment plant. Tetra Tech supported a preliminary design evaluation initially for the proposed treatment plant. The Bureau of Abandoned Mine Reclamation entered into an agreement with the Susquehanna River Basin Commission to provide treated acid mine drainage to supplement flow during low flow periods.

Project Designer; Design for Oil and Gas Projects; Various Clients; WV. Mr. Yanero has supported the design of various design projects for oil and gas clients in West Virginia, including the design of gas well pads, access roads, E&S plans, and mitigation and monitoring of streams. Design and mapping services were provided using Civil 3D software.



Section E: Project Descriptions



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*



Majorsville Pipeline Subsidence Investigation

Majorsville, Pennsylvania

CLIENT/CONTACT:

MarkWest Energy

PROJECT HIGHLIGHTS:

- Subsidence investigation
- Preparation of pipeline alignment profiles
- Georeferencing of mine maps and depths of mine workings

Tetra Tech is currently performing 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.

Relevant mine maps for the area of interest were reviewed. The mine workings which fall under the proposed pipeline alignments include active and abandoned longwall mines as well as a section of abandoned room and pillar mining. Tetra Tech georeferenced the maps and depths of the mine workings and the positions of the proposed pipeline alignments. Profiles of the pipeline alignments were prepared to determine the relative depth from the surface to the mine workings.

Based on the depths, types of mining, and projected future mining Tetra Tech recommended that an engineering subsidence evaluation be completed that would include stress/strain calculations and the identification and sizing of the anticipated subsidence trough. This information would be supplied to the designer of the pipeline for their use.





Marjol Battery Plant Mine Subsidence Evaluation, Mine Fire Assessment, and RFI Oversight

Throop, Pennsylvania

CLIENT/CONTACT:

EPA Region 3

PROJECT HIGHLIGHTS:

- Met a tight three-week deadline to complete this project
- Passive acid mine drainage treatment alternatives reviewed
- Assessment of nearby mine fire
- HEC-RAS hydraulic modeling

Tetra Tech is providing technical assistance to EPA Region 3 to evaluate mine subsidence and oversee an RFI at the former Marjol Battery Plant. The project involved providing geological and hydrogeological analysis of matters relating to mine subsidence and contaminant fate and transport, supporting EPA at public meetings, split sampling with the owner-operators, and the technical review of work plans and the RFI report submitted by the owner-operators. The project also includes providing field oversight of rock coring, soil and ground-water sampling, monitoring-well installation, downhole video, and packer testing. In addition, Tetra Tech assessed a nearby mine fire to determine its impact on the area.

This project was politically sensitive, because off-site migration of the contaminants into nearby residential areas resulted in a CERCLA removal action. Political and community awareness of the RFI activities on site was high. This RFI was monitored by members of Pennsylvania's congressional delegation, and at least one prospective presidential candidate was filmed outside the site prior to the Pennsylvania Primary.

This site is underlain by several coal mining voids, providing an unusual geologic and hydrogeologic setting. Tetra Tech provided EPA with expertise in mine subsidence, because that issue will be important to determine the final corrective measure. Tetra Tech also provided EPA with expertise in contaminant fate and transport and engineering controls of contaminant movement associated with the site. In addition to providing extensive field oversight, Tetra Tech has reviewed the RFI work plan and the draft RFI report for compliance with the work plan, as well as the aspects related to mine subsidence, contaminant fate and transport, and engineering controls of contaminant migration. Tetra Tech met a three-week deadline for this project.





Nelsonville Bypass Highway 33 Mine Subsidence Mitigation

Ohio

CLIENT/CONTACT:

Ohio Department of Transportation

PROJECT HIGHLIGHTS:

- State-of-the-art mine subsidence mitigation measures
- Value engineering to reduce the cost of the mitigation

The Highway 33 Nelsonville Bypass project in southeast Ohio includes 8.5-miles of 4-lane roadway and several interchanges. The estimated \$200 million project is being funded in part by the economic stimulus effort and is the largest such project in Ohio. The roadway is underlain by historic room and pillar coal mine workings located on multiple coal seams at shallow depth. Subsidence risks posed by these historic mine workings require mitigation to protect the roadway. Subsidence risk assessments and mitigation design conducted by the geotechnical team in conjunction with the State identified 14 sites along the alignment requiring subsidence mitigation with an estimated cost of approximately \$50 million. The mitigation efforts recommended include drilling and backfilling the mine voids using pressure grouting techniques with a sand-cement-fly ash mixture.

Tetra Tech was contracted by the Ohio Department of Transportation (ODOT) to provide value engineering services for alternative means and methods to reduce the cost of the subsidence mitigation effort. Several viable alternatives were identified and recommended with potential to realize significant cost savings, including:

- The use of a sand flushing technique incorporating an innovative state-of-the-art geofam® product to mobilize and transport the sand backfill in lieu of a water-based sand slurry or cement based grouts
- Column-building local roof support grouting techniques
- Real-time subsidence risk assessments to implement specific mitigation measures on a localized basis during the course of construction rather than uniform global treatment methods



Wyoming Abandoned Mine Lands Statewide Subsidence Hazards Mitigation Contract

Wyoming (Statewide)

CLIENT/CONTACT:

Wyoming Department of
Environmental Quality, AML Division

PROJECT HIGHLIGHTS:

- Because of success on this contract, Tetra Tech has been awarded a second, similar ID/IQ statewide contract
- Contract has been extended for an additional year
- Extensive use of GIS
- State-of-the-art geophysical imaging
- Subsurface investigations
- Air quality monitoring
- Subsidence hazards assessment

The Wyoming Abandoned Mine Lands (AML) Project 17.6A is a \$2.1M State-Wide ID/IQ contract for mitigating coal mine subsidence hazards awarded to Tetra Tech by the Wyoming Department of Environmental Quality Abandoned Mine Lands Division. Initial work under this contract includes assessment of subsidence hazards within the City of Rock Springs where historic underground coal mining resulted in approximately 900 acres of the city being undermined and a history of moderate to severe subsidence as a result.

Although subsidence mitigation efforts have been implemented through a number of previous projects for AML and the Bureau of Mines by others, Tetra Tech was selected for the current work on the basis of the unparalleled qualifications of its multi-disciplinary project team including specialists in geological engineering, forensic geotechnics, geophysical investigations, underground mine design and grouting. Detailed geomechanical characterization of the subsurface conditions coupled with highly advanced state-of-the-art geophysical imaging and processing techniques to delineate mine voids are being used to allow subsidence risks to be quantified and focused and cost-effective mitigation solutions to be developed.

As a result of outstanding work on this contract, Tetra Tech was **recently awarded a 2nd state-wide multi-year ID/IQ contract** for similar work and our **existing contract was extended for another year.**





West Elk Mine and Dry Fork Mining Areas Subsidence Evaluation

Gunnison County, Colorado

CLIENT/CONTACT:

Mountain Coal Company

PROJECT HIGHLIGHTS:

- Subsidence evaluation
- Computer modeling
- Evaluation of potential impacts



Mountain Coal retained Tetra Tech's Pittsburgh office to prepare a report to describe the extent to which projected subsidence would impact the surface area, including stream channel stability and sediment transport, at their West Elk Mine located in the Dry Fork mining area of Colorado. The new mining area extended their longwall mining under the upper areas of Dry Fork, a tributary to Minnesota Creek, and the upper areas of Deep Creek. A detailed discussion of the mine plan and projected subsidence for these areas was provided. A hydraulic and hydrologic evaluation was done to establish pre-mining, or baseline, conditions. The second portion of this evaluation described the potential and likely impacts of mining operations on the surface drainage system and channel characteristics.

Subsidence information obtained from the current West Elk Mine area was used to project subsidence processes, amounts, and the effects on the Dry Fork mining areas. The application document was prepared to comply with the Colorado Division of Minerals and Geology (CDMG) Regulations for Coal Mining, revised June 26, 2002, under Section 2.05.6, Mitigation of the Impacts of Mining Operations. Reconnaissance of the area was conducted in 2007.

Tetra Tech used the predicted subsidence information and the areas angle of draw to evaluate the potential impacts to: landslide and rockfall prone areas, a manmade reservoir, stock watering ponds, streams and ditches, prings, water-bearing zones, groundwater wells, roads, and buildings.

A detailed subsidence control plan was prepared and approved with only minor comments from the Colorado Division of Minerals and Geology.



IHI Mine Fire and Subsidence Evaluation

Rifle, Colorado

CLIENT/CONTACT:

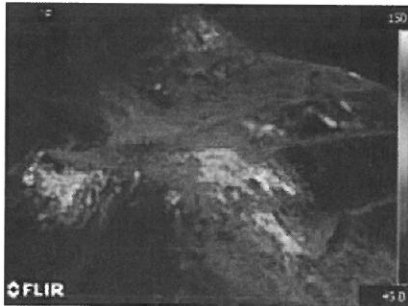
Colorado Division of Mining
Reclamation and Safety

PROJECT HIGHLIGHTS:

- Mine fire abatement
- Characterization of coal mine workings
- Thermal imagery
- Ventilation mapping
- 3D animation
- Geophysical services

The historic IHI coal mine was developed in the steeply dipping, 11-foot thick Wheeler coal seam. Coal was mined in Haas Canyon from 1898 to around 1945 in a number of mines. The IHI No. 3 coal mine, part of which is presently burning beneath the surface, operated from 1940 to 1945.

Beginning in 1948, a series of investigations and fire control projects were implemented to prevent the original mine fire from spreading into the active and abandoned mines in Haas Canyon, and the adjacent coal reserves. The previous projects temporarily reduced the fire activity, however, the fire has become increasingly active over the past few years and presents a hazard to public health and safety as well as a wildfire hazard. The surface expression of the fire includes several hot exhaust cracks and vents, some venting to 800 degrees Fahrenheit. The combination of the steep terrain and the large, underground mine voids provides the potential for future surface subsidence, particularly over the active mine fire or previous burnt areas. Ongoing subsidence allows oxygen intake which further fuels the active fire.



In 2009, Tetra Tech was selected as a subconsultant part of a project team to characterize the coal mine workings and determine the relationships that exist between the areas of subsidence, the burning coal seam, and the previously placed grout. The program includes utilizing non-invasive geophysical methods, thermal imagery, ventilation mapping, and 3D animation to accomplish the mine characterization. The results of the investigation will be utilized to develop a future mine fire abatement program at the IHI site. Tetra Tech's role includes providing coal mine fire expertise, health and safety protocols, thermal imagery, a smoke/inert gas tracer study, surveying, and GIS Implementation to evaluate 3-D geometrical relationships.



WVDEP Parker Run Design

Marion County West Virginia

CLIENT/CONTACT:

West Virginia Department of
Environmental Protection

PROJECT HIGHLIGHTS:

- Engineering design
- Construction monitoring

In 2013, Tetra Tech was retained by the West Virginia Department of Environmental Protection's AML&R Division to provide design services at the Parker Run sites in Marion County. The project is expected to include:

- Design of drainage conveyances
- Design installation of mine seals
- Highwall reclamation
- Design refuse reclamation
- Design of stream bank stabilization
- Design of structural demolition and trash removal and disposal
- Re-vegetation of disturbed areas

The project involves four sites that include highwalls, refuse piles, and portals and is currently ongoing. Aspects of the project design work include civil engineering, structural engineering, and geological and hydrogeological support.





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 (AML&R) 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 (AML&R) 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 AML&R.





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.

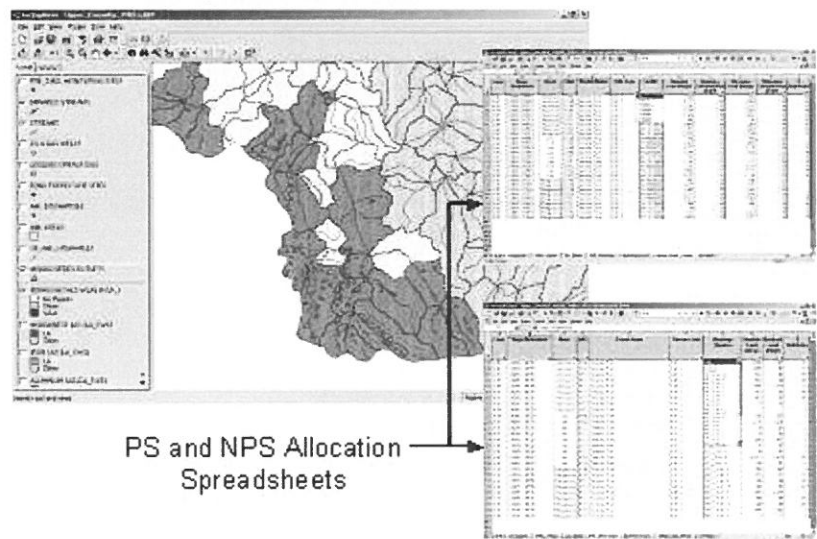
Development of the methodology also involved close collaboration between Tetra Tech, various divisions within WVDEP, including Division of Water and Waste Management, Division of Mining and Reclamation, Division of Oil and Gas, Division of Natural Resources, and Division of Forestry, and EPA Region 3. 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





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
- Mine subsidence mitigation
- AML reclamation plans
- Closure of mine openings
- Mine fire abatement
- Acid mine drainage treatment
- 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:

- Mine subsidence
- 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
- Water supply





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 P. Speranza
(Authorized Signature)

Mark P. Speranza, Operations Manager
(Representative Name, Title)

412-921-8916 412-921-4040
(Phone Number) (Fax Number)

12/24/2013
(Date)