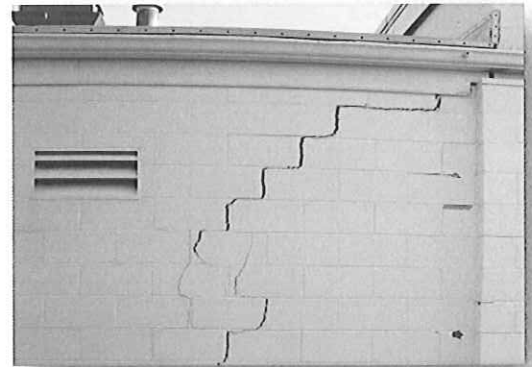




DEP15594 – Fairmont (Jackson Addition) Subsidence Design Expression of Interest

Prepared for:

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



Point of Contact:

Mr. Mikel Lutman, RPF
Tetra Tech NUS, Inc.
241 Kanar Drive
Morgantown, West Virginia 26508
(304) 241-5460
Email: mike.lutman@tetrattech.com

RECEIVED

2011 OCT 21 PM 4:02

WV PURCHASING
DIVISION



TETRA TECH



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

Request for Quotation

RFQ NUMBER
 DEP15594

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
 CHUCK BOWMAN
 304-558-2157

VENDOR

RFQ COPY
 TYPE NAME/ADDRESS HERE

SHIP TO

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

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
09/28/2011				

BID OPENING DATE: 10/26/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEMNUMBER	UNIT PRICE	AMOUNT
0001	1	JB		906-29		
FAIRMONT (JACKSON ADDITION) SUBSIDENCE 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 FAIRMONT (JACKSON ADDITION) SUBSIDENCE PROJECT IN MARION COUNTY, WEST VIRGINIA PER THE FOLLOWING BID REQUIREMENTS AND ATTACHED SPECIFICATIONS. BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THE STATE MAY DEEM THIS CONTRACT NULL AND VOID, AND TERMINATE SUCH CONTRACT WITHOUT FURTHER ORDER. ***** THIS IS THE END OF RFQ DEP15594 ***** TOTAL: _____						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>M. H. Sperry</i>	TELEPHONE (412) 921-7090	DATE 10/25/2011
TITLE OFFICE MANAGER	FEIN 95-466-0169	ADDRESS CHANGES TO BE NOTED ABOVE

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



Attachment B

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

Attachment "B"

PROJECT NAME Fairmont (Jackson Addition) Subsidence Design	DATE (DAY, MONTH, YEAR) 26, October, 2011	FEIN 95-4660169	
1. FIRM NAME Tetra Tech NUS, Inc.	2. HOME OFFICE BUSINESS ADDRESS 241 Kanar Drive Morgantown, West Virginia 26508	3. FORMER FIRM NAME NUS Corporation NUS Environmental Corporation Brown & Root Environmental	
4. HOME OFFICE TELEPHONE (304) 241-5460	5. ESTABLISHED (YEAR) 1960	6. TYPE OWNERSHIP Corporation	6a. WV REGISTERED DBE (Disadvantaged Business Enterprise) No
7. PRIMARY AML DESIGN OFFICE: ADDRESS/ TELEPHONE/ PERSON IN CHARGE/ NO. AML DESIGN PERSONNEL EACH OFFICE Foster Plaza 7, 661 Andersen Drive, Pittsburgh, PA 15220 / (412) 921-7090 / Mark Speranza, PE / 4 AML Design Teams in this office (4 Design Engineers and 4 CADD Professionals) and 4 additional CADD Professionals in this office			
8. NAMES OF PRINCIPAL OFFICERS OR MEMBERS OF FIRM Mr. Mark Perry, PE - President Mr. Mark Speranza, PE - Pittsburgh Office Manager			
9. PERSONNEL BY DISCIPLINE			
35 ADMINISTRATIVE — ARCHITECTS 8 BIOLOGIST 8 CADD OPERATORS 14 CHEMICAL ENGINEERS 24 CIVIL ENGINEERS 3 CONSTRUCTION INSPECTORS 4 DESIGNERS — DRAFTSMEN	2 ECOLOGISTS — ECONOMISTS 1 ELECTRICAL ENGINEERS 39 ENVIRONMENTALISTS 2 ESTIMATORS 20 GEOLOGISTS — HISTORIANS 5 HYDROLOGISTS	— LANDSCAPE ARCHITECTS 3 MECHANICAL ENGINEERS 6 MINING ENGINEERS — PHOTOGRAMMETRISTS — PLANNERS: URBAN/REGIONAL — SANITARY ENGINEERS 2 SOILS ENGINEERS — SPECIFICATION WRITERS	— STRUCTURAL ENGINEERS 3 SURVEYORS — TRAFFIC ENGINEERS 55 OTHER 234 TOTAL PERSONNEL (IN THIS OFFICE) 13,000+ Personnel company-wide
TOTAL NUMBER OF WV REGISTERED PROFESSIONAL ENGINEERS IN PRIMARY OFFICE: 3 *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. OUT. 3 KEY CONSULTANTS/SUB-CONSULTANTS ANTICIPATED TO BE USED. Attach "AML Consultant Qualification Questionnaire".

<p>NAME AND ADDRESS: TRIAD Engineering 219 Hartman Run Rd Morgantown, West Virginia 26505</p>	<p>SPECIALTY: Drilling</p>	<p>WORKED WITH BEFORE <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>NAME AND ADDRESS:</p>	<p>SPECIALTY:</p>	<p>WORKED WITH BEFORE <input type="checkbox"/> Yes <input type="checkbox"/> No</p>

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

YES Description and Number of Projects: Tetra Tech and its consultants have completed **over 300 abandoned mine land projects** - Attachment C is only a partial listing. Our Project Manager and Project Advisor have been working on abandoned mine reclamation projects for the past 24 years, with many in West Virginia. 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. The project will be managed by our Morgantown office and our Pittsburgh, PA and Charleston, WV offices will provide local support as needed.

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

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

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

YES Description and Number of Projects: Tetra Tech has over **three decades of experience** in hydrology and hydraulics with **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, GeHMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-5, HEC-DSS, and COED.

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

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

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

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

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

YES Description and Number of Projects: Tetra Tech and its personnel have extensive acid mine drainage evaluation and abatement design experience. Our firm has **recently completed 13 acid mine drainage evaluation/abatement design projects** and our personnel, including Project Manager Thomas Gray, PE, have completed **more than 30 acid mine drainage and abatement projects** at other firms. Mr. Gray also managed an open-end contract for the Maryland Bureau of Mines, which included over 16 projects relating to mining, acid mine drainage treatment, and mine reclamation.

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

NAME & TITLE (Last, First, Middle Int.) Lutman, Mikel, RPF Project Manager	YEARS OF AML DESIGN EXPERIENCE: 15	YEARS OF AML RELATED DESIGN EXPERIENCE: 20	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 25
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Brief Explanation of Responsibilities

Mr. Lutman is the Manager of Tetra Tech's new Morgantown office. He has more than 33 years of professional experience including more than 25 years in management or supervisory roles. Mr. Lutman has more than 20 years of Abandoned Mine Land related design experience and has completed a variety of mining projects throughout his career including mine fires, coal reserve evaluations, permitting, development of mine plans, hydrological studies, acid mine drainage treatment plans, involvement with start-up operations and daily mining activities, and the supervision of drilling and exploratory options.

EDUCATION (Degree, Year, Specialization) MS, 1977, Forest Hydrology / BS, 1975, Forest Resources Management	REGISTRATION (Type, Year, State) Registered Professional Forester American Tree Farm Inspector Registered Wastewater Treatment Plant Operator Certified Nuclear Densometer Operator/Handler
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS West Virginia Forestry Association Society of American Foresters	

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.) Gray, Thomas, A., PE Project Advisor	YEARS OF AML DESIGN EXPERIENCE: 25	YEARS OF AML RELATED DESIGN EXPERIENCE: 37	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 19
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Brief Explanation of Responsibilities

Mr. Gray recently managed the Paint Branch, Tunnelton, and Posey/Fisher Run AML projects for WVDEP. He previously worked at GAI, managing their Charleston, WV office in the 1990s. Since 2000, Mr. Gray has participated in more than 50 AMR projects and has managed 30 projects for the OSM, including mine fires. He also has **participated in several refuse design and highwall projects** and has managed contracts for PADEP and the MD BOM. He has also consulted to the WVDOH on mining issues. WVDEP projects include the Omega mine grouting project, Owings mine reclamation, Majesty mine reclamation, Godby branch water supply extension, and Left Hand Fork Refuse fire control. He has published over 30 articles related to mining and reclamation, including 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	REGISTRATION (Type, Year, State) Professional Engineer in five states including, West Virginia (1988); Pennsylvania (1978); Virginia (1980); Ohio (2009); and Maryland (1989)
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS Society of Mining Engineers - Distinguished Member Society of American Military Engineers Engineering Society of Western 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.) Hallman, Dave, PE, PG Project Engineer	YEARS OF AML DESIGN EXPERIENCE: 22
YEARS OF AML RELATED DESIGN EXPERIENCE: 22	
YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0	
Brief Explanation of Responsibilities <p>Mr. Hallman has over 20 years of experience specializing in geotechnical engineering and construction on a variety of mining and civil engineering projects throughout the world. His project experience includes the ODOT Highway 33 Mine Subsidence and Mitigation project, the Colorado Division of Reclamation, Mines and Safety (CDRMS) Mine Fire and Subsidence Investigation, the CDRMS Colorado Springs Mine Subsidence Evaluations, the Wyoming DEQ Mine Subsidence Evaluation and Mitigation, and the Sunrise Mine Subsidence Evaluations. His technical expertise includes mine subsidence, static and dynamic stability of embankments and natural slopes, landslide evaluation, rock slope stability, seismic risk assessments, liquefaction evaluations, dynamic deformation analyses, liner and seepage cutoff system design and evaluation, tailings and water dam design and construction, and design and construction of heap leach and landfill facilities.</p>	
EDUCATION (Degree, Year, Specialization) BS, 1983, Geological Engineering	
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS Society for Mining, Metallurgy, and Exploration	
REGISTRATION (Type, Year, State) Professional Engineer, 1994, Missouri; 2002, Texas; 1990, Alaska; 1989, Colorado; 2002, Wyoming; 1996, Idaho Professional Geologist, 2004, Wyoming	
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.) Byle, Michael, J., PE Project Engineer	YEARS OF AML DESIGN EXPERIENCE: 4
YEARS OF AML RELATED DESIGN EXPERIENCE: 27	
YEARS OF DOMESTIC WATERLINE EXPERIENCE: 10	
Brief Explanation of Responsibilities <p>Mr. Byle has more than 30 years of professional experience in geotechnical engineering. His background includes mine subsidence projects for a variety of clients including the U.S. Office of Surface Mining and the Pennsylvania Department of Transportation. Mr. Byle 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.</p>	
EDUCATION (Degree, Year, Specialization) MS, 1981, Civil Engineering BS, 1978, Civil Engineering	
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS Society of American Military Engineers American Society of Civil Engineers	
REGISTRATION (Type, Year, State) Professional Engineer, 1992, Pennsylvania; 1989, Virginia; 1990, Maryland; 2006, Minnesota; 2006, New Jersey; 1993, Delaware; 2008, New York; 2008, Florida; 2009, New Hampshire; 1983, Colorado	

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.) Cummings, Biff, D., PE Project Engineer	YEARS OF AML DESIGN EXPERIENCE: 17	YEARS OF AML RELATED DESIGN EXPERIENCE: 17	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 17
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Brief Explanation of Responsibilities

Mr. Cummings is a registered Professional Engineer in West Virginia and five additional states. His expertise includes **work on several refuse design and highwall projects**. It was contended by a homeowner that mine subsidence led to a landslide that was damaging his home and the coal company hired ICF Kaiser to support its defense. Mr. Cummings developed plans for the installation of slope monitors, supervised long-term data collection, analyzed data, evaluated seasonal hydrogeologic conditions, and provided documentation for use in court. He completed a variety of mine reclamation projects including the West Virginia Mark Mine Acid Drainage Abatement and various home subsidence investigations. He also performed AML related activities under contracts in WV, OH, MD, and VA, and subsidence evaluations for private firms and OSM in WV, PA, OH, and MD.

EDUCATION (Degree, Year, Specialization)

BS, 1978, Civil Engineering

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers

REGISTRATION (Type, Year, State)

Professional Engineer in six states including West Virginia (2004); Pennsylvania (1984); Ohio (1994); Illinois (2006); Alabama (2005), and Indiana (2004)

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.) Hoppe, Ben CAD Designer	YEARS OF AML DESIGN EXPERIENCE: 2	YEARS OF AML RELATED DESIGN EXPERIENCE: 6	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
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Brief Explanation of Responsibilities

Mr. Hoppe is a CAD Designer with over six years of relevant experience. He has performed design work on a variety of AML projects for the WVDEP including the Tunnelton Abandoned Mine Portals Closure Project, the Posey/Fisher Run AML project, and the Paint Branch AML project. His CAD design experience includes all phases of civil design work including but not limited to, site grading, proposed roadway geometry layout and utility layout. Mr. Hoppe is experienced in subdivision design, landfill design, and utility work and capable of providing accurate earthwork volumes for designs, layout of sewer and storm sewer systems (gravity and low pressure) using 3D models and complex grading designs using 3D civil software ensuring accuracy.

EDUCATION (Degree, Year, Specialization)

AAS, 2004

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

REGISTRATION (Type, Year, State)

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

NAME & TITLE (Last, First, Middle Int.) Strakal, Carl, J. Project Engineer	YEARS OF AML DESIGN EXPERIENCE: 8	YEARS OF AML RELATED DESIGN EXPERIENCE: 8	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
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Brief Explanation of Responsibilities

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

EDUCATION (Degree, Year, Specialization)

BS, 2002, Civil Engineering Technology

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

REGISTRATION (Type, Year, State)
Certified Pre-Blast Surveyor

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.) Whitney, Josh, EIT Project Engineer	YEARS OF AML DESIGN EXPERIENCE: 3	YEARS OF AML RELATED DESIGN EXPERIENCE: 3	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
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Brief Explanation of Responsibilities

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

EDUCATION (Degree, Year, Specialization)

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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

REGISTRATION (Type, Year, State)
Engineer-In-Training

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.) Ludwig, John Project Scientist	YEARS OF AML DESIGN EXPERIENCE: 3	YEARS OF AML RELATED DESIGN EXPERIENCE: 3	YEARS OF DOMESTIC WATERLINE EXPERIENCE: 0
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Brief Explanation of Responsibilities

Mr. Ludwig is the director of Tetra Tech's Charleston, WV office of TMDL and Water Resources Center. He is a senior environmental scientist with over ten years of experience providing technical and management support for clients in the areas of water resources, watershed and water quality assessment, watershed modeling and Total Maximum Daily Load (TMDL) development. In support of EPA and the WVDEP Division of Water and Waste Management (DWWM), he has served as the Project Manager in the development of over 1,900 EPA-approved TMDLs in West Virginia. He currently serves as the Project Manager for the existing TMDL contract with the WVDEP DWWM that includes the development of TMDLs for total iron, total manganese, dissolved aluminum, pH, selenium, fecal coliform bacteria, and biological impairments throughout the State of West Virginia.

EDUCATION (Degree, Year, Specialization)

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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Water Resources Association
Water Environment Federation

REGISTRATION (Type, Year, State)

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

NAME & TITLE (Last, First, Middle Int.) Wilkes, PWS, Samuel, P. Project Scientist	YEARS OF AML DESIGN EXPERIENCE: 0	YEARS OF AML RELATED DESIGN EXPERIENCE: 7	YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0
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Brief Explanation of Responsibilities

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

EDUCATION (Degree, Year, Specialization)

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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

Society of Wetland Scientists
Trout Unlimited

REGISTRATION (Type, Year, State)

Professional Wetland Scientist, 2003
Certified Forest Stand Delineator and Conservation Planner, 2003, Maryland

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

<p>NAME & TITLE (Last, First, Middle Int.) Kimmel, Thomas, W., PLS Surveyor</p>	<p>YEARS OF AML DESIGN EXPERIENCE: 0</p>	<p>YEARS OF AML RELATED DESIGN EXPERIENCE: 0</p>	<p>YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0</p>
<p>Brief Explanation of Responsibilities</p> <p>Mr. Kimmel has more than 38 years of survey work experience including the public sector transportation including highway, railroad, and airport surveys; private sector industrial, commercial and residential survey and land development work; in heavy construction survey work; and post-accident nuclear QA/QC inspection work and USNRC regulations at Three Mile Island. Mr. Kimmel is a member of the American Congress on Surveying and Mapping and the National Society of Professional Surveyors. He is also on the Board of Directors for the Pennsylvania Society of Land Surveyors.</p>			
<p>EDUCATION (Degree, Year, Specialization)</p> <p>BS, 1995, Applied Science and Technology with Surveying Specialization AS, 1973, Engineering and Surveying Technology</p>			
<p>MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS</p> <p>American Congress on Surveying and Mapping National Society of Professional Surveyors Pennsylvania Society of Land Surveyors</p> <p>REGISTRATION (Type, Year, State)</p> <p>Professional Land Surveyor: 1994, WV; 1975, PA; 1993, VA; 1990, MD; 1993, DE; 1994, NC; 1996, NJ; 1996, NY; 2003, OH</p>			

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

TR-55, STABL5M, HEC-HMS, GeohMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-
5, HEC-DSS and COED

Microsoft Office Professional and Microsoft Project

Adobe Photoshop

Adobe Acrobat Version 9.0

AutoCAD Map 3D 2008 / AutoCAD 2008

AutoDesk Civil 3D 2007

ESRI ArcGIS 9.2

ESRI ArcView 3.3

Bentley PondPack (Haestad Methods) Version 9.0

Bentley Flow Master (Haestad Methods)

Bentley HEC-Pack

STABL5M

Hydrologic Evaluation of Landfill Performance (HELP)

Groundwater Vistas Version 3.5 (MODFLOW based 3D finite difference model, including MT3D, RT3D, MODPATH, MODFLOWT, and
SWIFT Components

GMS (MODFLOW based 3D finite difference model, including MT3D, RT3D, MODPATH, and 3-D spatial analysis components)

Visual MODFLOW (MODFLOW based 3D finite difference model, including MODPATH)

SWANFLOW (3D finite difference model specializing in 3-phase fluid flow in porous media - water, NAPL, air)

Several analytical-based software packages including BIOCHLOR, BIOSCREEN, and SESOIL

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

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	NATURE OF YOUR FIRM'S RESPONSIBILITY	ESTIMATED CONSTRUCTION COST	PERCENT COMPLETE
WVDEP Abandoned Mine Land Source Tracking and Acid Mine Drainage Water Quality Modeling, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	Abandoned Mine Land Source Tracking and Assessment / Acid Mine Drainage Water Quality Modeling	\$4,100,000	Ongoing
WVDEP Total Maximum Daily Load Program, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	Development of TMDLs	\$500,000	Ongoing
TOTAL NUMBER OF PROJECTS: 2 (Only WVDEP projects are shown)			TOTAL ESTIMATED CONSTRUCTION COSTS:	\$4,600,000

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

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	ESTIMATED CONSTRUCTION COST	YEAR	CONSTRUCTED (YES OR NO)
WVDEP Fisher Run (Posey) Mine Reclamation, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Phillippi, 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 Phillippi, WV 26416	\$74,000	2010	Not yet constructed
WVDEP Tunnelton Mine Portal Closure Design, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Phillippi, WV 26416	\$62,300	2010	Yes
Colorado Springs Mine Subsidence Abatement, Colorado	Colorado Department of Natural Resources, Division of Reclamation, Mining, and Safety	N/A	2009	N/A
Bandy and King Subsidence Project, Virginia	Department of Mines, Minerals & Energy 3405 Mountain Empire Road Big Stone Gap, VA 24219	N/A	2011	N/A
West Elk Mine Subsidence Evaluation and Report, Colorado	Mountain Coal Company 5174 Highway 133 Somerset, CO 81434	N/A	2008	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
Sunrise Mine Abandoned Mine Land Monitoring, Wyoming	Wyoming Department of Environmental Quality, Abandoned Mine Land Division	N/A	2006	N/A

17. COMPLETED WORK WITHIN LAST 5 YEARS ON WHICH YOUR FIRM WAS THE DESIGNATED ENGINEER OF RECORD						
PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	ESTIMATED CONSTRUCTION COST	YEAR	CONSTRUCTED (YES OR NO)		
Ohio Valley Coal Company Mine Seal Closure Designs, Ohio	Ohio Valley Coal Company 56854 Pleasant Ridge Road Alledonia, OH 43902	N/A	2008	N/A		
Report on Current Mine Rescue Practices in China, China	Center for Disease Control, NIOSH	N/A	2008	N/A		
Western Pennsylvania Abandoned Mine Fire, Pennsylvania	Confidential Oil & Gas Client	N/A	2011	N/A		
Clear Creek Central City Superfund Site Remediation of Mine Waste Pile with Acid Mine Drainage, Colorado	Colorado Department of Public Health and Environment 4300 Cherry Creek Drive South Denver, CO 80246	\$1,400,000	2007	Yes		
Bear Run Acid Mine Drainage Passive Treatment System, Pennsylvania	Indiana County Conservation District in conjunction w/PADEP 1432 Route 286 Hwy. E Indiana, PA 15701	\$250,000	2010	Yes		
Gladden Mine Site Grading Plan and Acid Mine Drainage Treatment System, Pennsylvania	South Fayette Conservation Group in conjunction w/PADEP 515 Millers Run Road Morgan, PA 15064	\$3,600,000	2009	Yes		
Water Balance Study, Water Study, Ohio	Confidential Client	N/A	2010	N/A		
Casselman Mine AMD Prevention and Response Plan, Maryland	Maryland Energy Resources, LLC 6015 Ferguson Road Indiana, PA 15701	N/A	2010	N/A		

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	
N/A						
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. Only a sample of projects are shown in this attachment.						
20. The foregoing is a statement of facts. Signature: <u>Mark P. Spanza</u> Title: <u>Pittsburgh Office Manager</u> Printed Name: <u>Mark Speranza, PE</u> Date: <u>October 26, 2011</u>						



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/Reuse 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	Biff Cummings, PE	Josh Whitney, EIT

FEATURED PROJECTS

Virginia DMMME Bandy/King Home Subsides	C	TAB E	X							X						X	M				P		
ODOT Highway 33 Subsidence Mitigation	C	TAB E	X							X						X	P						P
West Elk Mine Subsidence Evaluation and Report	C	TAB E				X										X	M						
Colorado Springs Mine Subsidence Project	C	TAB E	X													X							M
Marjol Plant RFI and Mine Subsidence Evaluation	C	TAB E				X										X	P						
Sunrise Mine AML Subsidence Monitoring	C	TAB E				X										X							P
Wyoming DEQ Statewide AML Subsidence Contract	C	TAB E	X			X										X							P
Majorsville Pipeline Alignment Subsidence Study	C	TAB E	X													X	P						
Colorado School of Mines Subsidence Abatement	C	TAB E	X													X							P
Troy Mine Subsidence Evaluations	C	TAB E	X													X							M

* 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.

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	Biff Cummings, PE	Josh Whitney, EIT

MINE STABILITY/GEOTECHNICAL PROJECTS

OSM Geotechnical Investigation	P															X	M						
Sand Springs Coal Pile Slope Stabilization	P		X	X												X	M						
Monogahela Properties Geotechnical Investigation	P															X	M						
Harrison Power Mining and Foundation Investigation	P															X	M						
Marlin Mine Dynamic Stability Evaluation	P															X							P
Ten-Mile Pass Limestone Quarry Mine Slope Stability	P															X							P
Pueblow Viejo Mine Rock Slope Stability Evaluation	P															X							P
Howe Pit Slope Stability for Denver Mining Operations	P															X							P
Meeker Mine Settling Pond Geotechnical Investigation	P															X							P
Coeur Rochester Mine Stability Assessment	P															X							P
Island Creek Coal Longwall Mining Panel Evaluation	P															X	M						
OSM Monogahela Geotechnical Investigation	P															X	M						

* 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.



Personnel



MIKEL LUTMAN, RPF

Project Manager

Mr. Lutman has more than 33 years of professional experience in coal, mining, and civil engineering and is the manager of Tetra Tech's Morgantown location. He has more than 20 years of Abandoned Mine Land related design experience and has completed a variety of mining projects throughout his career including mine fires, refuse removal/stabilization, coal reserve evaluations, permitting, development of mine plans, hydrological studies, acid mine drainage treatment plans, involvement with start-up operations and daily mining activities, and the supervision of drilling and exploratory options.

EDUCATION
MS, Forest Hydrology BS, Forest Resources Management
REGISTRATIONS
Registered Professional Forester
YEARS EXPERIENCE
33

Staff Member; Everettville Refuse Reclamation; WVDEP – AML Division; Monongalia County, WV. Mr. Lutman was a member of the design team responsible for developing plans and specifications for the reclamation of the abandoned refuse pile and impoundment located near Everettville, WV. Plans included impoundment and refuse stabilization, mine seal units, drainage control and a revegetation plan. The community of Everettville was located immediately downstream of this project which posed a level of concern for safety.

Staff Member; Mine Fire Plan; Maryland Bureau of Mines; Garrett County, MD. Member of the design team responsible for developing a plan to determine the extents and condition of a coal seam mine fire located near the community of Lonaconing, Maryland. A follow up plan for abatement of the fire was later developed to address the situation.

Project Manager; Removal and Stabilization of Coal Refuse; American Bituminous Power Partners; Marion County, WV. Mr. Lutman provided services to assist with the removal and stabilization of coal refuse materials from various abandoned disposal sites as a result of previous mining activities. Additional services included developing plans for several AMD collection/treatment systems and related agency permits (WVDEP-DWWM/"UIC" Permit).

Project Manager; Acid Mine Drainage Treatment Abatement; Friends of Cheat; Preston County, WV. As a Project Manager, Mr. Lutman was involved with various projects in the Cheat River Watershed Basin that focused on Acid Mine Drainage (AMD) abatement. Scope of services for these projects included devising various passive treatment systems that were matched to the existing site conditions. Steel slag leach bed units were also incorporated into several of the projects to supply additional alkalinity for extended treatment.

Project Manager; Mine Development, Permitting and Planning Activities; Shafer Brothers Construction Company; Monongalia County, WV. Mr. Lutman served as the Project Manager responsible for development and permitting activities involving the coal industry. Services consisted of procurement of reserves, drilling activities and evaluation of results, mine planning and environmental permitting involving stream and wetland resources, mitigation and restoration planning. Mr. Lutman was



responsible for the overall project management which included client interface, managing environmental and cultural resources field staff, threatened and endangered species coordination and overseeing the preparation of the USACE Nationwide 14 permit and section 401 Water Quality Certification permits.

Project Manager; Mine Evaluation Study; Summit At Cheat Lake (Residential Housing); Monongalia County, WV. Mr. Lutman was responsible for the development of a 120 acre residential housing development complex located near Morgantown, WV. Initial duties involved conducting a mine evaluation study to determine the extents and conditions of previously deep and surface mined areas within the project area. A follow up grouting and stabilization program was devised for the various sections of the development property. "High-End" residential dwellings are currently being built on the areas that have been stabilized.

Project Manager; Mine Evaluation Study and Grouting/Stabilization Program; Grove Park Place; Monongalia County, WV. Mr. Lutman was responsible for the development of a *mixed-use* Commercial/Residential Complex located near Morgantown, WV. Initial duties involved conducting a mine evaluation study to determine the extents and conditions of previously deep mined areas within the project area. A follow-up grouting and stabilization program was devised for the subject property tract. This site is currently supporting several commercial office complex buildings and a section of residential townhouse units.

Project Manager; Mining Due Diligence Services; Blue Ridge Development; Monongalia County, WV. Mr. Lutman was responsible for providing *due-diligence* services involving the evaluation of a 700-acre land tract that was subject to historic surface and deep mining activities. Services provided for this project included research and reconnaissance of historic mining information and mapping for the area of interest, development of an exploratory drilling plan to establish existing mining extents and to evaluate existing conditions of the abandoned deep mining activities. A preliminary grouting and stabilization plan was developed to assist the potential owners with an estimated costing model.



THOMAS GRAY, PE

Project Advisor

Mr. Gray has more than 39 years of professional mining experience and has completed more than 100 mining projects in his career, including various mine subsidence projects. He is a technical expert in mine engineering, subsidence, mine reclamation, and mine fire mitigation. Mr. Gray specializes in active and abandoned mining projects and with infrastructure projects that have mining-related concerns. He has managed various AML projects for the WVDEP including the Fisher Run Mine Drainage Portal Closure and the Tunnelton Mine Drainage Portal Closure. He is a member of many industry organizations and is recognized as a Distinguished Member in the Society for Mining, Metallurgy, and Exploration. In addition to authoring over 25 mining-related publications, Mr. Gray has made presentations at mining conferences around the U.S.

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

Project Manager; Mine Subsidence Investigations; 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 thus far 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. Winter weather in 2010 and property owner constraints have postponed the drilling until 2011. Drilling operations will include downhole camera services by the Federal Office of Surface Mining (OSM). After the drilling is completed a report will be drafted including recommendations for addressing the subsidence features.

Project Manager; Natural Gas Pipeline Subsidence Study; MarkWest Energy; Southwestern PA. Mr. Gray led a natural gas pipeline subsidence evaluation for MarkWest Energy who 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 Pennsylvania. 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 Manager; West Elk Mine Subsidence Evaluation; Mountain Coal Company, LLC; Somerset, CO. Mr. Gray managed this project and completed subsidence evaluation and report for ten longwall panels extending into the Dry Fork lease in Gunnison County, Colorado. Potential impacts to the Deep Creek Ditch were evaluated.



Senior Project Manager; Longwall Mining Subsidence Evaluation; Consol Energy; Greene County, PA. Mr. Gray managed this project and evaluated longwall mining subsidence and impacts to surface structures.

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

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

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

Project Manager; Majorsville Pipeline Alignment Subsidence Study; MarkWest Energy; Majorsville, PA. Project Manager for this 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. 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.

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



BIFF CUMMINGS, PE

Project Engineer

Mr. Cummings has more than 33 years of professional experience in the engineering civil, geotechnical, and geo-environmental engineering in design, consulting, construction and project management. He has particular expertise with and abandoned mine land reclamation (refuse reclamation, mine and spoil fires, mine drainage and seals, regrading and vegetation of spoil piles, landslide investigation and abatement, subsidence abatement, and stream channel restoration), geotechnical engineering, mine subsidence, and slope stability.

Project Manager; AEP Southern Ohio Coal Company Barnes Mine Subsidence/Landslide Litigation; Fairmont, WV. Managed this landslide/mine subsidence litigation case. It was contended by a homeowner that mine subsidence led to a landslide that was damaging his home and the coal company hired ICF Kaiser to support its defense. Mr. Cummings developed plans for the installation of slope monitors, supervised long-term data collection, analyzed data, evaluated seasonal hydrogeologic conditions, and provided documentation for use in court to defend the coal company.

Project Engineer; Office of Surface Mining Various Subsidence Projects; Various Locations in PA and MD. Mr. Cummings served as a Project Engineer on several home subsidence projects in Pennsylvania and Maryland for the Office of Surface Mining. These projects were located in Penn Hills and Bridgeville, Pennsylvania and Frostburg, Maryland.

Project Geotechnical Engineer; Union Pacific Railroad Company Subsidence and Geotechnical Evaluation; Long Beach, CA. Provided geotechnical evaluation and technical design review of remedial activities at the 31-acre Toyota Parcel. Established parameters for construction of a cap and pavement over the site, which consisted of swamps containing oil field production waste. Also developed an investigation program consisting of cone penetrometer, standard test boring and geotechnical test to evaluate potential the potential subsidence at the site due to the increase in loading cause by site grading operations. Evaluated material stabilization and oil drainage collection systems.

Project Manager/Senior Engineer; Parkway Center Mall Subsidence Investigation and Foundation Rehabilitation; Pittsburgh, PA. Managed the investigation, design, and construction program for the rehabilitation of the foundation system of this \$30 million shopping mall including deep mine grouting. The mall was settling leading to severe structural damage due to differential settlement and subsidence. For this project, Mr. Cummings developed subsurface exploration plans, analyzed the data obtained, designed methods to support the mall without restricting business operations, and managed construction oversight.

Senior Project Manager; Babst, Calland, Clements and Zomnir Subsidence Investigation and Expert Report. Prepared an expert report regarding design and construction of clay lined industrial waste landfill cells and investigated the causes of subsidence in a drainage pipe located beneath the cells.

EDUCATION
BS, Civil Engineering
REGISTRATIONS
Professional Engineer: WV, PA, OH, IN, IL, NCEES
YEARS EXPERIENCE
33



MICHAEL BYLE, PE

Project Engineer

Mr. Byle has more than 30 years of professional experience in geotechnical engineering. His background includes mine subsidence projects for a variety of clients including the U.S. Office of Surface Mining and the Pennsylvania Department of Transportation. Mr. Byle 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
MS, Civil Engineering BS, Civil Engineering
REGISTRATIONS
Professional Engineer: PA, VA, MD, NJ, DE, NY, NH, FL, MN, CO
YEARS EXPERIENCE
33

Project Manager; U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, Bills/Keefe Mine Subsidence; Cambria County, PA. Project Manager 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. Prepared the design and specifications for this work and provided construction-phase consultation.

Lead Geotechnical Engineer; Pennsylvania Department of Transportation, District 4-0, I-81 Section AIR Mine Subsidence Investigation; Luzerne County, PA. Discipline Manager responsible for geotechnical studies and mine subsidence investigation for rehabilitation of an existing highway interchange and construction of a proposed new roadway. The site lies in the Northern Anthracite Coal region of Pennsylvania and surface and subsurface coal mining had historically occurred in the area for approximately 150 years. Directed research and analysis of mining maps, reports, and other historical information concerning surface and subsurface coal mining in the project area. Responsible for completing geotechnical exploration for roadways and structures and developing foundations to support proposed structures and mitigate the effects of previous mining.

Project Manager; Mine Subsidence Evaluation; Aspen, CO. Project Manager responsible for geologic, slope stability, and mine subsidence evaluation for hotel development at the base of Aspen Mountain. The project involved evaluation of stability of mine waste slopes, interpretation of mine maps, and evaluation of subsidence potential due to abandoned 19th century silver mines, as well as geologic hazard evaluation and design of stabilization measures. Prepared studies and reports and specifications for slope stability, mine hazard mitigation, and building foundations.



DAVID HALLMAN, PE, PG

Project Engineer

Mr. Hallman has over 20 years of experience specializing in geotechnical engineering and construction on a variety of mining and civil engineering projects throughout the world. His project experience includes the ODOT Highway 33 Mine Subsidence and Mitigation project and dozens of other subsidence, stability, and geotechnical projects. His technical expertise includes mine subsidence, static and dynamic stability of embankments and natural slopes, landslide evaluation, rock slope stability, seismic risk assessments, liquefaction evaluations, dynamic deformation analyses, liner and seepage cutoff system design and evaluation, tailings and water dam design and construction, and design and construction of heap leach and landfill facilities.

EDUCATION
BS, Geological Engineering
REGISTRATIONS
Professional Engineer: MO, TX, CO, WY, ID, AK, WY Professional Geologist: WY
YEARS EXPERIENCE
28

Principal Engineer; Coal Mine Subsidence Evaluation and Mitigation Value Engineering; Nelsonville, OH. Principal Engineer responsible for value engineering to identify alternative means and methods to reduce the cost of subsidence mitigation efforts for historic underground room and pillar coal mines underlying 8.5 miles of 4-lane roadway. The work was conducted for the Ohio Department of Transportation in conjunction with the \$200 million Highway 33 Nelsonville Bypass project funded as part of the economic stimulus plan.

Principal Engineer; Coal and Clay Mine Subsidence Investigations, Golden and Colorado Springs; CO. Responsible for project management for geotechnical investigations for a demonstration project on the use of geophysical imaging techniques for mine subsidence evaluations for the Colorado Department of Natural Resources, Division of Reclamation, Mines and Safety. The sites targeted for the initial investigations include the Colorado School of Mines campus and a residential neighborhood.

Principal Engineer; Coal Mine Subsidence Evaluation and Mitigation; Rock Springs, Wyoming. Responsible for project management, coordination and senior geotechnical review for multi-disciplinary technical teams evaluating and mitigating subsidence risk over extensive historic underground room and pillar coal mines in developed and undeveloped areas as initial task orders under a multi-year state-wide ID/IQ contract for subsidence mitigation with the Wyoming Department of Environmental Quality, Abandoned Mine Land Division. The project included the use of state-of-the-art geophysical imaging to provide better definition of the subsidence hazards than traditional methods based on a grid drilling approach. Required extensive use of GIS systems to process and assimilate large volumes of existing data, monitoring of active ground movements and participation in public information meetings.

Technical Specialist; Sunrise Mine Subsidence Potential/Reclamation Measure Evaluations; Guernsey, WY. Evaluated subsidence potential and reclamation measures of large subsidence features associated with block caving practices at this historic iron mine. Assessed landslide-induced wave action associated with potential failure of a large open pit filled with water. Developed automated slope monitoring system to provide warning of impending failure(s) to protect potential downstream inundation zones.



CARL STRAKAL

Project Engineer

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

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

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

Project Engineer; 13-West Airshaft CMAP Modules; Consolidation Coal Company; Pine Bank, PA. Completed and submitted various PADEP CMAP Modules per Airshaft site for the Blacksville Number 2 mine. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Project Engineer; 13-Degas CMAP Modules; Consolidation Coal Company; Pine Bank, PA. Completed and submitted various PADEP CMAP Modules per degasification pads and access roads. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Project Engineer; Stone Quarry SMP Modules; Haydentown, PA. Completed and submitted various PADEP SMP Modules per Stone Quarry (Limestone). Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Project Engineer; Prime Air Shaft CMAP Modules; MEPCO; Mt. Morris, PA. Completed and submitted various PADEP CMAP Modules per Prime Air Shaft. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

Project Engineer; Four West CMAP Modules; MEPCO; Mt. Morris, PA. Completed and submitted various PADEP CMAP Modules per Prime Air Shaft. Generated base mapping for all associated Modules. Conducted all necessary field work per Module requirements.

EDUCATION
BS, Civil Engineering Technology
REGISTRATIONS
Certified Pre-Blast Surveyor
YEARS EXPERIENCE
8



JOSH WHITNEY, EIT

Project Engineer

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

EDUCATION
MS, Mining/Minerals Engineering BS, Mining/Minerals Engineering
REGISTRATIONS
Engineer-In-Training
YEARS EXPERIENCE
3

Project Engineer; Highwall Stability Analysis; A & G Coal Corporation. Utilization of NIOSH ARMPS, Rockpack III, and Colorado Rockfall Simulation Program to develop a detailed report for submission to the Mine Safety and Health Administration (MSHA) in order to gain approval for operations.

Project Engineer; Total Maximum Daily Load (TMDL) Study; Confidential Client. Developed spreadsheet for entering continuous depth data from in-stream monitors in order to determine stream flow for open channels and weirs. Data was used to determine total dissolved solids and total suspended solids.

Project Engineer; Virginia DMLR Renewal Reports; Several Virginia Massey Operations. Mr. Whitney was tasked with the completion of permit renewal for several of Massey's surface and underground operations. These renewals include the completion of a public notice and filing, analysis of surface and ground water data, and completion of NPDES forms. The completion of the NPDES form involves a review of the mine site sediment control plan to determine drainage area delineation and ground conditions.

Project Engineer; Reclamation Costing Analysis; Cumberland Resources Corporation; Appalachia, VA. Volume calculations utilizing AutoCAD were performed and subsequent costing of material and vegetation needed were estimated to determine total reclamation cost.

Project Engineer; Underground Mining Expansion; Massey Energy; Appalachia, VA. Mr. Whitney completed a Virginia Department of Mine Land Reclamation permit for the expansion of approximately 2,000 acres of additional underground mining. This permitting action involved the analysis of potential groundwater impacts, stream protection calculations, and pillar stability analysis.

Project Engineer; Virginia DMLR Permitting; Cumberland Resources; Appalachia, VA. This Virginia Department of Mine Land Reclamation permitting action involved the addition of surface mine coal acreage, elimination of valley fill designations, analysis of settling pond and spillway capacities, and mine site sediment control plan alterations. The pond and spillway calculations and sediment control plan alterations (including ditch design) involved the utilization of SEDIMOT, Flowmaster and SEDCAD to determine surface runoff and drainage structure capacities.



SAMUEL WILKES, PWS

Project Scientist

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

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

Field Coordination Manager; United States Forest Services Abandoned Mine Land Surveys; Gila and Lincoln National Forests in NM. Mr. Wilkes served as the field coordination manager and assisted with the inventory of over 700 abandoned mine sites throughout the Gila and Lincoln National Forests in New Mexico. He was responsible for the preliminary review of the abandoned mine land database, plotting abandoned mine land sites on topographic maps, and assisting in the three months of site field verification. Once site locations were verified, GPS coordinates; photographs, and an abandoned mine land inventory worksheet (which included information about open adits, shafts, tailings piles, overburden piles, acid mine drainage, subsidence, and any other human or environmental hazards) were completed for each site.

The hard copy data was entered into an electronic database and delivered to the U.S. Forest Service for remediation prioritization and management purposes. Problems such as open adits, shafts and pits; exposed tailings and waste rock piles typically result in acidic runoff; and acid mine drainage directly from flooded adits or shafts typically exist at abandoned mine sites. Elevated heavy metals concentrations found in soils, tailings, waste rock and acidic waters draining from these sites can adversely affect human health or the environment.

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

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



JON LUDWIG

Project Scientist

Mr. Ludwig is the director of Tetra Tech's Charleston, WV office of TMDL and Water Resources Center. He is a senior environmental scientist with over ten years of experience providing technical and management support for clients in the areas of water resources, watershed and water quality assessment, watershed modeling and Total Maximum Daily Load (TMDL) development. In support of EPA and the WVDEP Division of Water and Waste Management (DWWM), he has served as the Project Manager in the development of over 1,900 EPA-approved TMDLs in West Virginia. He currently serves as the Project Manager for the existing TMDL contract with the WVDEP DWWM.

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

Project Scientist; Mining NPDES Permit Support for WVDEP; WV. Over the past few years, Tetra Tech has supported WVDEP in the development of metals TMDL development for the Coal River watershed. At the request of WVDEP, Tetra Tech conducted a comprehensive analysis to determine the cumulative effect of backsliding at various downstream locations in the Coal River watershed. Mr. Ludwig served as the project manager and technical lead for this project that utilized the calibrated watershed model that was constructed for TMDL development (MDAS) to provide solutions and guidance as to which areas of the Coal River watershed could sustain manganese technology-based effluent limits while maintaining compliance with water quality criteria in the effective zones. Results were summarized into graphical displays in an easy to use format so that WVDEP DMR permit writers can address the above mentioned request letters and issue/re-issue permits quickly and efficiently.

Project Manager; West Virginia TMDL Development for Hydrologic Groups A, B, C, and D; WV. Under contract with WV DWWM, currently serving as project manager for more than 950 metals (iron, dissolved aluminum, manganese, and selenium), pH, fecal coliform bacteria, and biological TMDL in the Upper Kanawha River, Upper Ohio North, Lower Kanawha River, North Branch/Potomac River, Coal River, Gauley River, Potomac River Direct Drains, Greenbrier River, New River, Little Kanawha River, and James River watersheds. These impairments were modeled using various EPA approved models and methodologies such as, MDAS and DESC-R for metals and fecal coliform bacteria. A strength-of-evidence stressor identification methodology was used to identify the likely stressors to the biological community and TMDLs were developed for these stressors.

Project Manager; WV TMDL Development Support for EPA Region 3; WV. For EPA Region 3, served as project manager for the development of over 1,000 pH and metals TMDLs in West Virginia including the Monongahela River, West Fork River, Tug Fork River, and Guyandotte watersheds. Provided lead role both technically and administratively in the evaluation of data and pollutant sources to assess and determine relationships between acid mine drainage and in-stream metals concentrations. Developed various technical approaches related to mining impacts (nonpoint and point sources) on metals loading and applied the Mining Data Analysis System (MDAS), a dynamic watershed modeling tool, to develop TMDLs throughout West Virginia.



BEN HOPPE

Lead CADD Professional

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

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

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

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

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

CAD Designer; Erosion and Sediment Pollution Control Plan; East Monongahela Sportsman's Club; Elizabeth, PA. Responsibilities included creating existing contours and existing site plan from information provided by surveyor. Design of proposed grading plan including sections, volume calculations and erosion and sediment pollution control measures.

EDUCATION
AAS
REGISTRATIONS
N/A
YEARS EXPERIENCE
7



THOMAS KIMMEL, PLS

Surveyor

Mr. Kimmel has more than 38 years of survey work experience including the public sector transportation including highway, railroad, and airport surveys; private sector industrial, commercial, and residential survey and land development work; in heavy construction survey work; and post-accident nuclear QA/QC inspection work and USNRC regulations at Three Mile Island. Mr. Kimmel is a member of the American Congress on Surveying and Mapping and the National Society of Professional Surveyors. He is also on the Board of Directors for the Pennsylvania Society of Land Surveyors.

Survey Manager; GTS Technologies, Inc.; Harrisburg, PA. Responsibilities included management and coordination and planning of survey work, cost estimation, record research, and calculations within many of the states currently licensed. Responsible for coordinating survey information between field and office as well as implementing specific quality control measures to ensure accuracy of plans and data with experience extending to GPS, EDM data collection, and AutoCAD.

Surveyor; LSC, Inc.; York, PA. Supervision of property, topographic, and title surveys; flood and mortgage certifications; land subdivisions; residential, commercial, and industrial site development plans from conceptual phase to final approval, including as-built surveys in Maryland and Pennsylvania.

Surveyor; Stewart & March, Inc.; York PA. Responsible for all construction layout for a large site/heavy industrial construction contractor. Some boundary retracement, land subdivision, road design, and stormwater calculations.

Site Manager and Testing Lab Supervisor; CEC, Inc. at TMI Nuclear Generating Station; Middletown, PA. Responsible for Quality Assurance Program, site activities, and personnel for contracted post accident inspection services to GPU Nuclear. Work included soils and concrete testing, equipment calibration, and supervision of technicians including the certification of outage inspectors. ANSI certified for civil/structural, mechanical, structural welding, and receipt inspections. Boundary retracements and land subdivision surveys were conducted privately.

Senior Project Surveyor; Navarro & Wright, Inc.; New Cumberland, PA. Responsible for the creation of the transportation survey section to better meet the client's needs and PennDOT's requirements. This was done by purchasing of new equipment, invoking appropriate procedures, and the hiring of surveying personnel.

EDUCATION
BS, Applied Science & Technology AS, Engineering/Surveying Technology
REGISTRATIONS
Professional Land Surveyor: WV, PA, VA, MD, DE, OH, NY, NJ, NC
YEARS EXPERIENCE
38



Project Descriptions



BANDY AND KING MINE SUBSIDENCE PROJECTS

Norton and Wise, Virginia

CLIENT:
Virginia Department of Mines, Minerals, and Energy
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Preliminary engineering report▪ Subsidence stabilization recommendations▪ Drilling oversight▪ Surveying

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, Virginia and Wise, Virginia.

The reclamation projects include drilling to determine the location of mine voids and Tetra Tech made recommendations for the abatement of subsidence in the study area. 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'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 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 provided.



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



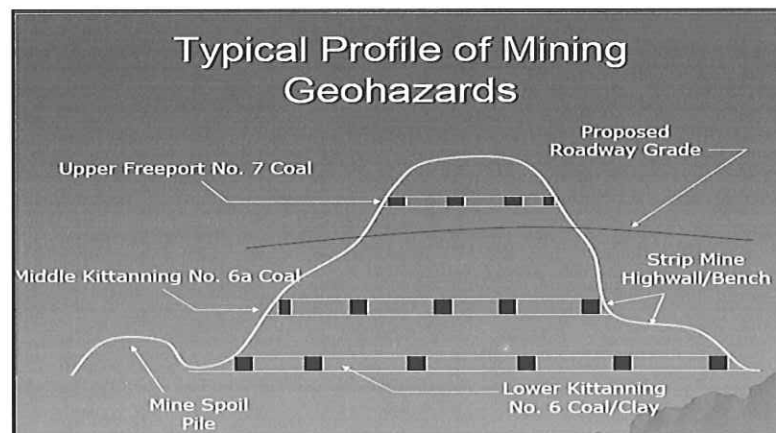
ODOT HIGHWAY 33 NELSONVILLE BYPASS MINE SUBSIDENCE MITIGATION

Nelsonville, Ohio

CLIENT:
Ohio Department of Transportation
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Estimated \$200,000,000 project▪ Value engineering to reduce cost of mine subsidence mitigation effort

The Highway 33 Nelsonville Bypass project includes 8.5-miles of 4-lane roadway and several interchanges. The estimated \$200M 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 \$50M. The mitigation efforts recommended include drilling and backfilling the mine voids using pressure grouting techniques with a sand-cement-fly ash mixture.

Tetra Tech provided 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, and; 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.





MARJOL BATTERY PLANT RFI OVERSIGHT AND MINE SUBSIDENCE EVALUATION

Throop, Pennsylvania

CLIENT:
EPA
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Met three-week deadline to complete this project▪ Geomorphic modeling and sediment load analysis▪ HEC-RAS hydraulic modeling

Tetra Tech provided technical assistance to EPA Region 3 to oversee an RFI at the former Marjol Battery Plant in Throop, Pennsylvania. The project includes providing field oversight of rock coring, soil and ground-water sampling, monitoring-well installation, downhole video, and packer testing. The project also involved providing technical support to EPA, including 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. 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 RFI review.





MAJORSVILLE PIPELINE ALIGNMENT MINE SUBSIDENCE STUDY

Majorsville, Pennsylvania

CLIENT:
MarkWest Energy
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Subsidence investigation▪ Preparation of pipeline alignment profiles

Tetra Tech is 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.





WYOMING DEQ ABANDONED MINE LAND STATEWIDE ID/IQ CONTRACT

Wyoming

CLIENT:

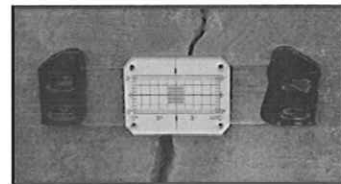
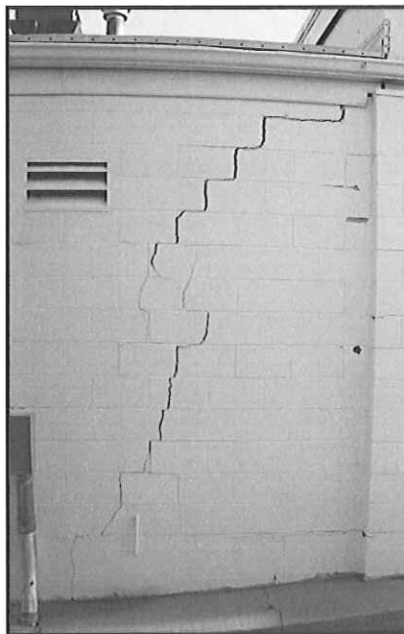
Wyoming Department of
Environmental Quality

PROJECT HIGHLIGHTS:

- Statewide ID/IQ contract
- Assessment of subsidence hazards

The Wyoming Abandoned Mine Lands Project 17.6A is a State-Wide ID/IQ contract for mitigating coal mine subsidence hazards and was 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 from the 1860s to 1950s resulted in approximately 900 acres of the city being undermined with a history of moderate to severe subsidence as a result.

Although subsidence mitigation efforts were implemented through a number of previous projects for the AML Division 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 cost-effective mitigation solutions to be developed.





COLORADO SPRINGS MINE SUBSIDENCE ABATEMENT

Colorado Springs, Colorado

CLIENT:

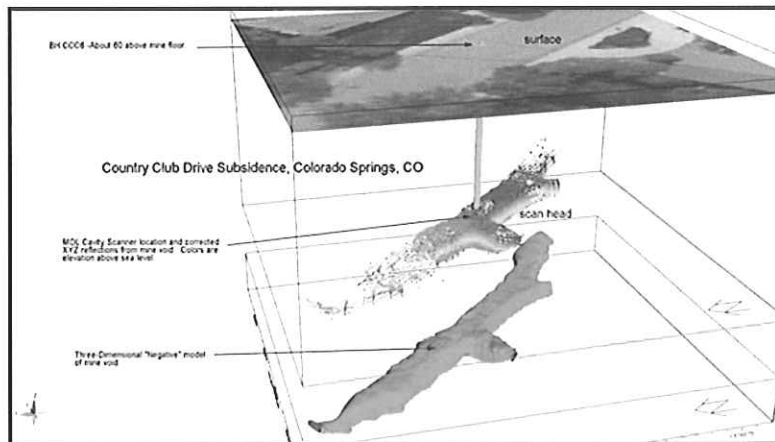
Colorado Department of Natural Resources

PROJECT HIGHLIGHTS:

- Mine subsidence hazards assessment
- State-of-the-art geophysical imaging
- Subsurface investigations

Approximately 16 million tons of coal was mined underground in an area that now underlies parts of Colorado Springs. Coal mining occurred from the late 1800's to the 1950's to use in fuel transportation, gold mining and home heating applications. After the mines closed, many previously rural areas in the coal field were subsequently developed as residential subdivisions and suburbs of Colorado Springs. The shallow underground coal mines typical of this coal field have continued to subside and cause damage, posing serious hazards to the public and homeowners. Thick deposits of unconsolidated sand over thin claystone and sandstone roof strata have caused sudden and spectacular surface subsidence events ranging from settlement of a few inches to sink holes up to 12 feet in diameter and 12 feet in depth.

Tetra Tech was selected as part of a project team on the basis of the team's unparalleled qualifications in geological engineering, geophysical investigations, underground mine design, and grouting. Detailed geomechanical characterization of the subsurface conditions provided by Tetra Tech was coupled with highly advanced state-of-the-art geophysical imaging and processing techniques to delineate mine voids. Subsurface investigations included the use of laser cavity scanning surveys, down hole cameras, and 3D imaging to characterize the mine voids which were subsequently backfilled using an innovated foam-based sand slurry.





COLORADO SCHOOL OF MINES SUBSIDENCE ABATEMENT

Golden, Colorado

CLIENT:

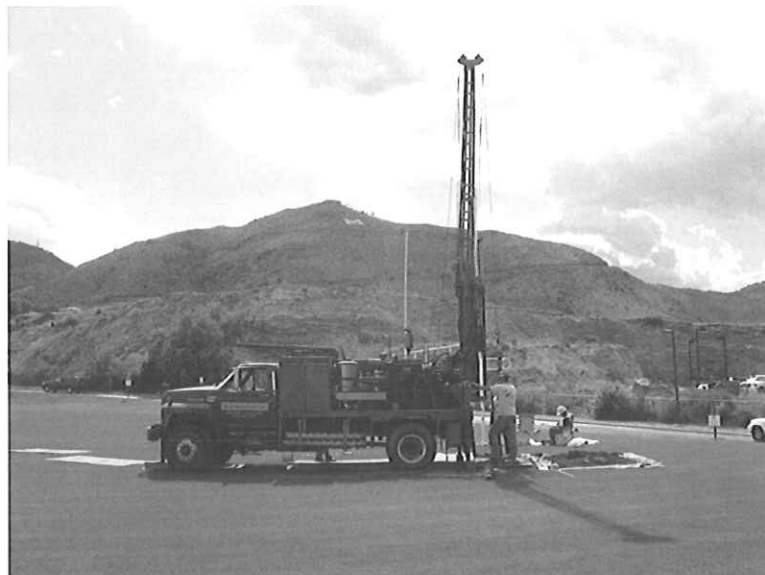
Colorado Department of Natural Resources

PROJECT HIGHLIGHTS:

- Geomechanical characterization of subsurface conditions
- State-of-the-art geophysical imaging

The western portion of the Colorado School of Mines campus was the location of historic coal mining and clay mining. In this area the sedimentary strata are tilted up vertically by structural deformation related to the Front Range uplift and movement on the Golden Fault. This structural orientation of the seams made extraction of coal and clay relatively easy to mine, beginning in about 1877. As a result of underground mining, subsidence, the poorly-backfilled and un-backfilled sections of coal and clay mines has caused chronic subsidence damage at the surface for the past 40 years. These events have ranged from damage and condemnation of married student housing units, gaping subsidence holes in the athletic field, damage and destruction of street improvements, and a 15 feet deep sinkhole that appeared suddenly in West Campus Drive.

Tetra Tech was selected as part of a project team on the basis of the team's unparalleled qualifications in geological engineering, geophysical investigations, underground mine design and grouting. Detailed geomechanical characterization of the subsurface conditions provided by Tetra Tech was coupled with highly advanced state-of-the-art geophysical imaging and processing techniques to delineate mine voids and allow subsidence risks to be better quantified.





WEST ELK MINE AND DRY FORK SUBSIDENCE EVALUATION

Gunnison County, Colorado

CLIENT:
Mountain Coal Company, LLC
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ 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.





TROY MINE SUBSIDENCE EVALUATIONS

Libby, Montana

CLIENT:
U.S. Forest Service
PROJECT HIGHLIGHTS:
▪ Subsidence evaluations for a geotechnical assessment

At the request of the Kootenai National Forest, Tetra Tech evaluated two mine subsidence features at Genesis, Inc.'s Troy Mine. The subsidence features were examined and mapped (both underground and at the surface) with the objective of preparing a geotechnical assessment of sinkhole formation at the mine.

The two sinkholes developed at the surface some 270 and 320 feet, respectively, above the underground workings at the mine. Sinkhole #1 was about 50 feet wide and 50 feet deep, with a volume at the time of backfilling of about 2,550 cubic yards. Sinkhole #2, located approximately 150 feet north-northwest of the first sinkhole, is about 135 feet long in an east-west direction and about 100 feet wide in a north-south direction. It ranges from 20 to 30 feet deep. The volume of the second sinkhole has been estimated at 8,800 cubic yards.

The ultimate cause of the sinkholes was determined to be mining activity that penetrated the East Fault without leaving buffer zones of solid rock between the underground workings and East Fault zone. Failure at the level of the mine propagated upward from the mine workings as chimney failures through the intensely fractured and deeply weathered rock of the East Fault, producing the two sinkholes. Adequate buffer zones to prevent mining up against the East Fault, along with properly sized and secured mining drifts (tunnels) passing through the fault would likely have prevented caving and surface subsidence. It was further determined that the Troy mine operating permit did not specifically provide for buffer zones or preclude surface subsidence. The mine operators were consequently not obligated to take measures to mitigate subsidence.

Tetra Tech was also asked to develop conclusions regarding the potential for sinkholes, such as those that occurred at the Troy Mine, to occur at the proposed Rock Creek Project. It was concluded that the potential for subsidence at the Rock Creek project is minimal to nonexistent. Furthermore, at hard rock room and pillar mines, such as the proposed Rock Creek project, surface subsidence is not an inevitable consequence of mining, provided that the mine is properly designed to prevent subsidence.



SUNRISE MINE AML SUBSIDENCE MONITORING

Guernsey, Wyoming

CLIENT:

Wyoming Department of
Environmental Quality

PROJECT HIGHLIGHTS:

- Installation of a real-time remote monitoring instrumentation system to monitor pit highwall stability

The Sunrise Iron Mine was owned and operated by Colorado Fuel & Iron from the late 1800's until production ceased in 1980. Open pit and underground block caving methods were employed to extract ore from three principal ore bodies; Sunrise Pit, Columbia Gulch and Central Ore Body.

Caving into the large cavities that remained daylighted the underground workings and resulted in vertical and in some cases overhanging subsidence features. This subsidence and continued spalling and failure of the rims created extreme hazards.

The potential for mass failure of an entire wall of the Sunrise Pit created concerns for displacement of a large volume of water from the now flooded pit. The potential flood wave poses a low-probability but high consequence risk to residents a short distance downstream.

Tetra Tech personnel installed a real-time remote monitoring instrumentation system to monitor stability of the pit highwall. This system consisted of a network of crack gauges powered by a solar-battery configuration and a computer controlled robotic total station which automatically surveyed prisms located on the opposite pit wall. Data from both types of instruments were then sent by wireless telemetry and the internet to the engineering personnel who were able to monitor for slope movements from the office.

