



DEP15606 – Colliers Sportsman Club Highwall 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

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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
 DEP15606

PAGE
 1

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

RFQ COPY
 TYPE NAME/ADDRESS HERE

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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: 10/27/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		906-29		
COLLIERS SPORTSMAN CLUB HIGHWALL DESIGN						
EXPRESSION OF INTEREST						
<p>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 COLLIERS SPORTSMAN CLUB HIGHWALL PROJECT IN BROOKE COUNTY, WEST VIRGINIA PER THE FOLLOWING BID REQUIREMENTS AND ATTACHED SPECIFICATIONS.</p> <p>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.</p>						
***** THIS IS THE END OF RFQ DEP15606 ***** TOTAL:						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE *Mark Sperry* TELEPHONE (412) 921-7040 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'



TETRA TECH

October 27, 2011

Mr. Chuck Bowman
State of West Virginia
Purchasing Division
2019 Washington Street, East
P.O. Box 50130
Charleston, West Virginia 25305-0130

Subject: RFQ #DEP15606 – Colliers Sportsman Club Highwall Design

Dear Mr. Bowman:

Tetra Tech is pleased to submit our Expression of Interest to perform design services in reply to RFQ #DEP15606 for the State of West Virginia. As outlined in our Expression of Interest, Tetra Tech, our project team, and its personnel have completed work on *hundreds of mine reclamation projects* including highwall stability projects. These projects have included services that will be needed for this project.

This project will be managed out of Tetra Tech's Morgantown office. Our firm also has office locations in Pittsburgh, Pennsylvania and Charleston, West Virginia, which can provide local support if needed. Tetra Tech is joined on this project by:

- **TRIAD Engineering (TRIAD)**, which will provide drilling services if required. Our firms have previously worked together. The TRIAD office for this project is located in Morgantown, WV.

Our experienced team is led by Mikel Lutman, RPF, the manager of our Morgantown location. 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.

Mr. Thomas Gray, PE will support this project as an advisor. Mr. Gray is a licensed Professional Engineer in five states including West Virginia and has participated in over *100 mining projects* throughout his career.

As requested by the RFP we have provided one original submittal, one copy, and one copy on CD-ROM. We appreciate this opportunity to provide this proposal, and look forward to answering any questions you may have. If you should require any additional information, please contact me at (412) 921-7090.

Very truly yours,

Mr. Mark Speranza, PE
Pittsburgh Office Manager

Enclosures



Attachment B

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

Attachment "B"

PROJECT NAME Colliers Sportsman Club Highway Design	DATE (DAY, MONTH, YEAR) 28, 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
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		
8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS		

9. PERSONNEL BY DISCIPLINE

35 ADMINISTRATIVE	2 ECOLOGISTS	— LANDSCAPE ARCHITECTS	— STRUCTURAL ENGINEERS
— ARCHITECTS	— ECONOMISTS	3 MECHANICAL ENGINEERS	3 SURVEYORS
8 BIOLOGIST	1 ELECTRICAL ENGINEERS	6 MINING ENGINEERS	— TRAFFIC ENGINEERS
8 CADD OPERATORS	39 ENVIRONMENTALISTS	— PHOTOGRAMMETRISTS	55 OTHER
14 CHEMICAL ENGINEERS	2 ESTIMATORS	— PLANNERS: URBAN/REGIONAL	
24 CIVIL ENGINEERS	20 GEOLOGISTS	— SANITARY ENGINEERS	
3 CONSTRUCTION INSPECTORS	— HISTORIANS	2 SOILS ENGINEERS	234 TOTAL PERSONNEL (IN THIS OFFICE)
4 DESIGNERS	5 HYDROLOGISTS	— SPECIFICATION WRITERS	
— DRAFTSMEN			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? YES NO N/A

11. OUTSIDE 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, GeohMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-5, HEC-DSS, and COED.

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

YES Description and Number of Projects: Tetra Tech employs 15 GIS and CADD personnel in its Pittsburgh 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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS
West Virginia Forestry Association
Society of American Foresters

REGISTRATION (Type, Year, State)
Registered Professional Forester
American Tree Farm Inspector
Registered Wastewater Treatment Plant Operator
Certified Nuclear Densometer Operator/Handler

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 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

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS
Society of Mining Engineers - Distinguished Member
Society of American Military Engineers
Engineering Society of Western Pennsylvania

REGISTRATION (Type, Year, State)
Professional Engineer in five states including, West Virginia (1988); Pennsylvania (1978); Virginia (1980); Ohio (2009); and Maryland (1989)

<p>13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES RESPONSIBLE FOR AML PROJECT DESIGN (Furnish complete data but keep to essentials)</p>	
<p>NAME & TITLE (Last, First, Middle Int.) Hallman, Dave, PE, PG Project Engineer</p>	<p>YEARS OF AML DESIGN EXPERIENCE: 22</p>
<p>YEARS OF EXPERIENCE YEARS OF AML RELATED DESIGN EXPERIENCE: 22</p>	
<p>YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: 0</p>	
<p>Brief Explanation of Responsibilities</p> <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>	
<p>EDUCATION (Degree, Year, Specialization) BS, 1983, Geological Engineering</p>	
<p>MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS Society for Mining, Metallurgy, and Exploration</p>	
<p>REGISTRATION (Type, Year, State) Professional Engineer, 1994, Missouri; 2002, Texas; 1990, Alaska; 1989, Colorado; 2002, Wyoming; 1996, Idaho Professional Geologist, 2004, Wyoming</p>	
<p>13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES RESPONSIBLE FOR AML PROJECT DESIGN (Furnish complete data but keep to essentials)</p>	
<p>NAME & TITLE (Last, First, Middle Int.) Byle, Michael, J., PE Project Engineer</p>	<p>YEARS OF AML DESIGN EXPERIENCE: 4</p>
<p>YEARS OF EXPERIENCE YEARS OF AML RELATED DESIGN EXPERIENCE: 27</p>	
<p>YEARS OF DOMESTIC WATERLINE EXPERIENCE: 10</p>	
<p>Brief Explanation of Responsibilities</p> <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>	
<p>EDUCATION (Degree, Year, Specialization) MS, 1981, Civil Engineering BS, 1978, Civil Engineering</p>	
<p>MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS Society of American Military Engineers American Society of Civil Engineers</p>	
<p>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</p>	

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

NAME & TITLE (Last, First, Middle Int.) 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 dozens of geotechnical 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
	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 (CMAF) 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
	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)

NAME & TITLE (Last, First, Middle Int.)	NAME & TITLE (Last, First, Middle Int.)	NAME & TITLE (Last, First, Middle Int.)
Kimmel, Thomas, W., PLS Surveyor	Kimmel, Thomas, W., PLS Surveyor	Kimmel, Thomas, W., PLS Surveyor
Brief Explanation of Responsibilities		
<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>		
EDUCATION (Degree, Year, Specialization)		
BS, 1995, Applied Science and Technology with Surveying Specialization AS, 1973, Engineering and Surveying Technology		
MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS		
American Congress on Surveying and Mapping National Society of Professional Surveyors Pennsylvania Society of Land Surveyors		MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS American Congress on Surveying and Mapping National Society of Professional Surveyors Pennsylvania Society of Land Surveyors

14. PROFESSIONAL DESIGN SERVICES PRIMARY OFFICE WHICH WILL BE USED TO COMPLETE AN

TR-55, STABL5, HEC-HMS, GeoHMS, HECFFA, HEC-SSP, HEC-DSSVue, HEC-ResSim, CWMS and legacy software such as HEC-1, HEC-5, HEC-DSS and COED

Microsoft Office Professional and Microsoft Project

Adobe Photoshop

Adobe Acrobat Version 9.0

AutoCAD Map 3D 2008 / AutoCAD 2008

AutoDesk Civil 3D 2007

ESRI ArcGIS 9.2

ESRI ArcView 3.3

Bentley PondPack (Haestad Methods) Version 9.0

Bentley Flow Master (Haestad Methods)

Bentley HEC-Pack

STABL5M

Hydrologic Evaluation of Landfill Performance (HELP)

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

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

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

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

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

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

PROJECT NAME, TYPE AND LOCATION	NAME AND ADDRESS OF OWNER	NATURE OF YOUR FIRM'S RESPONSIBILITY	ESTIMATED CONSTRUCTION COST	PERCENT COMPLETE
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 Phillippi, 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 Phillippi, 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 Philippi, WV 26416	\$292,600	2010	Yes		
WVDEP Paint Branch Abandoned Mine Land Project, West Virginia	WVDEP Office of Abandoned Mine Lands and Reclamation 105 S. Railroad Street Philippi, WV 26416	\$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 Philippi, 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, 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, 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		



Attachment C



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

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

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

Project Manager; OSM Coal Refuse Pile Slope Stabilization; Allegany County, MD. Prepared an abatement plan for stabilizing the slope of a coal refuse pile (Sand Spring gob pile) adjacent to a small stream. The refuse pile was eroded by the stream during Hurricane Ivan and left a near vertical, unstable



slope. The abatement plan consisted of a combination of regrading and vegetative ("soft armoring") and riprap stabilization. Hydrologic and hydraulic analyses were also provided.

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

Project Manager; Geotechnical and Hydrologic Investigation; Inter-Power/AlCon Partners; Colver, PA. Conducted a geotechnical and hydrologic investigation for a 53'-high embankment dam to provide a municipal water supply and cooling water for a cogeneration power plant. Completed an environmental assessment, including wetland delineation, wetland mitigation design and cultural resources investigations. Provided design, cost estimating, permitting and construction monitoring services for the Dam and Reservoir.

Project Manager; Mine Development Plans and Geotechnical Evaluation; Island Creek Coal (subsidiary to Occidental Petroleum); Bayard, WV. Completed mine development plans, cost estimating, and permitting services for the mining of coal waste and the disposal of AFBC ash at the North Branch Mine, including exploration and geotechnical evaluation.

Project Manager; Structural Integrity Investigation; Island Creek Coal (subsidiary to Occidental Petroleum); Grant and Tucker Counties, WV. Structural integrity investigation project for a 125-foot-high, 500 kV steel lattice transmission tower immediately above chain pillars separating two longwall panels of a 300 feet deep mine. Responsible for evaluations, including structural analysis and prediction of the impacts of active longwall mining on the electrical transmission tower.

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; 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

Geotechnical 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 geotechnical engineering, slope stability, 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 Engineer; YMCA Subsurface Investigation; YMCA; Beaver County, PA. Served as geotechnical engineer for this project that included the selecting of sample locations and the monitoring of drilling of five test borings totaling 125 feet at those locations of the proposed building. The drilling helped to provide data on the subsurface conditions and samples of soil and rock were also obtained. Water levels were measured in the test borings during and at the completion of drilling. Tetra Tech also performed analyses using test boring information.

Project Manager; 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.

Geotechnical Engineer; Everett Geotechnical Investigation; Monsanto; Everett, MA. Designed a system for encapsulating 45,000 cy of separate phase product in soil using a slurry wall and cap. The design for the 2500-foot long and up to 60-foot deep slurry wall required an elaborate geotechnical investigation with test borings on 50 centers due erratic subsurface conditions. Also developed and managed a detailed laboratory testing program to evaluate various backfill options and benonite mixtures. Evaluated embankment stability and developed design parameters for sheet pile wall installations.

Geotechnical Engineer; SCP Carlstadt Geotechnical Review; U.S. EPA; Meadowland, NJ. Provided technical design review of geotechnical related interim remedial measures performed at the 5.9-acre site including sheet pile wall, slurry wall (Gundwall) and HDPE liner.

Geotechnical Engineer; Geotechnical Investigation of Landfill Sites; Becancour, Quebec. Provided technical review for geotechnical investigation and assessment of foundation conditions for the project which included the preliminary geotechnical investigation and evaluation for two 400-acre landfill sites. Performed a subsurface exploration program, chemical and physical testing of soil samples, evaluated bearing capacities, potential settlements, and a report with conclusions and recommendations.

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



MICHAEL BYLE, PE

Geotechnical Engineer

Mr. Byle has more than 30 years of professional experience in geotechnical engineering. His background includes mining projects for a variety of clients including the U.S. Office of Surface Mining. 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.

EDUCATION
MS, Civil Engineering BS, Civil Engineering
REGISTRATIONS
Professional Engineer: PA, VA, MD, NJ, DE, NY, NH, FL, MN, CO
YEARS EXPERIENCE
33

Geotechnical Engineer; Geotechnical Evaluation; Metaltec; Franklin, NJ. Evaluated conditions, prepared specifications and provided construction oversight for grouting to support a treatment building sited on a remediated area. The work involved interpretation of geotechnical conditions, alternatives analysis, preparation of performance specifications and construction oversight and monitoring for compaction grouting performed to improve loose fill materials to provide support for the treatment building.

Geotechnical Engineer; Geotechnical Investigations; Glenrock, Rolling Hills Wind Farms; Glenrock, WY. The Glenrock and Rolling Hills Wind Farms comprise 132 1.5MW wind turbines situated in a reclaimed strip mine area. Mine spoils up to 107 feet deep were revealed in the geotechnical exploration. Mr. Byle directed the investigations and design of foundations for the project including spread footing bearing on native soils and rock, as well as, dynamic compaction of mine spoils at 13 wind turbine sites where mine spoils were less than 40 feet deep, and drilled/grouted micro-piles and H-piles for 16 sites where deeper mine spoils would make dynamic compaction impractical. Mr Byle provided oversight and review for geotechnical investigations, foundation design and construction of foundations and earthwork for the project. Additional efforts included evaluation of electrical and thermal resistivity of the soils at the sites for buried collector systems. Mr. Byle also provided peer review for civil and structural design for the project.

Geotechnical Engineer; National Grid Smith Street Site Geotechnical Investigation; Troy, NY. The Smith Street Site is a former manufactured gas plant (MGP) containing residual contamination located on the banks of the Hudson River. One side of the site consists of a steel sheet pile wall, approximately 40 feet high and 250 feet long that was constructed circa 1910. Mr. Byle planned and directed the geotechnical investigation including geotechnical borings and rock cores conducted on the land and in the river adjacent to the existing wall to assess conditions in order to evaluate the stability of the wall.

Geotechnical Manager; Bryce Jordan Center Geotechnical Investigations/Design; Pennsylvania State University; State College, PA. Geotechnical Manager responsible for directing the geotechnical investigations, foundations design, specification preparation, bid selection, and construction observation and testing for foundations and ground modification for a 16,000-seat academic/athletic convocation and events center. The foundation system was designed to be shallow spread footings bearing on grouted limestone, which saved nearly \$1 million over the alternate drilled-pier foundations.



DAVID HALLMAN, PE, PG

Geotechnical Engineer

Mr. Hallman has over 28 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 dozens of other geotechnical, stability, and subsidence projects. His technical expertise includes geotechnical evaluations, mine subsidence, static and dynamic stability of embankments and natural slopes, landslide evaluation, rock slope stability, and seismic risk assessments.

Geotechnical Engineer; Dresden Cooling Tower Rock Wall Stability Evaluation; Dresden, IL. Senior Geotechnical Engineer responsible for evaluation of rock wall stability during excavation for twin 25-foot deep vertical cooling tower intake sumps in layered sandstone, shale, and limestone strata.

Geotechnical Engineer; Coal and Clay Geotechnical Investigations; Golden and Colorado Springs, CO. Principal Engineer 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 in Colorado Springs.

Geotechnical Engineer; Crystal Cave Geotechnical Evaluation; Jefferson County, CO. Senior Geotechnical Engineer responsible for project management and geotechnical evaluation of a natural cave exposed during aggregate quarry development. Provided recommendations to address public safety and liability concerns associated with reclamation and conversion of the quarry land to open space with attendant public access.

Geotechnical Engineer; Ten-Mile Pass Limestone Quarry Rock Slope Stability Assessment; Soda Springs, ID. Preliminary assessment of rock slope stability for this proposed limestone quarry as part of an overall mine plan evaluation. Subsequent access road development included rock slope excavations, which exceeded recommended slope angles and triggered slope failures necessitating remedial design.

Geotechnical Engineer; Pueblo Viejo Mine Rock Slope Stability Evaluation; Dominican Republic. Geotechnical Engineer responsible for evaluation of rock slope stability for major expansion of the open pit gold mining operation in support of privatization studies of the current operations. Preliminary designs include ultimate pit dimensions of roughly 2.5 kilometers by 1.5 kilometers with a maximum depth of 330 meters extending to sea level.

Geotechnical Engineer; Reservoir Stability Analysis; Antero; Hartsel, CO. As Staff Engineer, conducted a detailed stability analysis of the embankment and foundation soils for the Antero earthfill dam for submission to regulatory agencies.

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



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.

EDUCATION
AAS
REGISTRATIONS
N/A
YEARS EXPERIENCE
7

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.



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
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Project Descriptions



GLADDEN MITIGATION DESIGN & HIGHWALL EVALUATION

South Fayette, Pennsylvania

CLIENT:

South Fayette Conservation Group

PROJECT HIGHLIGHTS:

- Evaluation of unstable highwall site
- Geotechnical Evaluation
- Passive drainage treatment design



The South Fayette Conservation Group, in conjunction with the PADEP Bureau of Abandoned Mine Reclamation, retained Tetra Tech for the design of a passive acid mine drainage treatment system. The abandoned mine portal discharges approximately 1,000 gallons per minute of acid mine drainage into Millers Run. With the aeration and mixing of the flow the pH rises and the iron oxide is precipitated out of the flow, resulting in several miles of iron oxide precipitation and low oxygenated water.

In support of the design, Tetra Tech surveyed the site and prepared a topographic map, installed monitoring wells to monitor the mine pool elevation, delineated wetlands, evaluated several alternative site configurations. One of the sites evaluated had an unstable highwall. Tetra Tech conducted a geotechnical evaluation of the site, performing a hydrologic evaluation of the floodplain, and preparing the site layout and grading plan design. Tetra Tech also prepared construction drawings, specifications, construction cost estimates and applicable PADEP permits.

The design consisted of the excavation of a 3-acre basin on private property adjacent to a four-lane highway, railroad right-of-way, and an adjacent property owner. The treatment will consist of a directional bore into the mine to allow gravity flow of the mine drainage into a limestone bed and into the 3-acre holding basin. In July 2009, the South Fayette Conservation Group applied for a PADEP Growing Greener Grant to fund the investigation, design, and construction of a stream flow loss mitigation project. In order to build the Gladden Discharge Mitigation Design flow into the mine needed to be reduced because sufficient property could not be acquired to build the passive treatment design. By reducing the flow into the mine the design size could be decreased in size and the currently acquired property would be enough to install a passive treatment system to handle the mine discharge.

Weirs were first installed along with continuous water level monitors at the top and bottom of the stream channels. The data collected from the water level monitors was then used to determine flows at the top and the bottom of the stream channels as well as flow loss in the streams. A design is currently underway to use Fabriform liner in two of the channels and grouting techniques in a third to reduce flow into the mine.



WYOMING 17K CONTRACT FOR RECLAMATION OF HIGHWALLS AND ABANDONED MINE SITES

Wyoming

CLIENT:
Wyoming Department of Environmental Quality
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Reclamation of highwalls and other abandoned mine sites▪ Pre-design and final design of reclamation activities▪ Pre-construction support

The Wyoming Department of Environmental Quality Abandoned Mine Lands (AML) Project 17K includes reclamation of a hazardous gravel pit within the town limits of Cody and return of the property to public use as a park and amphitheater, as well as reclamation of a gypsum mine south of Cody and multiple sulfur mines near Cody.

The abandoned mine sites included unstable highwall cuts up to 50 -ft high, several open portals with noticeable Hydrogen sulfide (H₂S) emissions, spoil piles containing sulfide bearing rock located in drainages, steep drainages with poor site access, remnants of smelter and crusher equipment, small tailings/settling ponds deposits, large disturbed areas, sulfur contaminated areas and many small open pits.



Reclamation strategies adopted at the individual sites included:

- Backfill pits and workings with mine refuse and grade highwalls to stable slopes
- Place lowest pH sulfur bearing backfill (rust colored sandstone) in the deeper portions of the fill and inert material (grey colored rock) on the outer portions of the fill
- Encapsulate low pH backfill by covering with lime mixture (limestone and fly ash) or by constructing a stable evapo-transpiration (ET) vegetative cap layer where possible
- Remove all sulfur-bearing rock from drainages and disturbed areas
- Construct several rock check dams for sediment control in steeper portions of disturbed drainage
- Revegetate disturbed areas



YMCA BEAVER COUNTY GEOTECHNICAL INVESTIGATION AND REPORT

Beaver County, Pennsylvania

CLIENT:
YMCA of Beaver County
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Geotechnical investigation and report▪ Drilling oversight

Tetra Tech was retained by the YMCA of Beaver County to perform a subsurface investigation and geotechnical report for a proposed site. The proposed site for the YMCA, in New Brighton, Pennsylvania, was underlain by a soil zone which was approximately 20 feet thick. This soil zone consisted of two layers, a pavement/fill layer and a natural soil layer. The pavement/fill layer was comprised of a surficial asphalt pavement and two to six feet of medium compact to compact silty slag fill. The natural soil layer varies in thickness between 14 and 17 feet. This layer was comprised of heterogeneous mixtures of clays, silts, and sands. The softer materials in this layer were considered to be compressible. A layer of hard sandstone was encountered at approximately 20 feet below the existing grade.

Based on the data obtained and the analysis performed, Tetra Tech recommended that cast-in-place concrete caissons bearing on the hard sandstone be used to support the structural loads of the building. Further, Tetra Tech also recommended the use of a structural floor slab in areas where the final grade was to be higher than the existing grade. This recommendation was based on the conclusions presented in the final report; namely, that the underlying natural soil layer would not support building and/or new fill loads without significant potential for differential settlement. Tetra Tech's field activities included the selecting of sample locations and the monitoring of drilling of five test borings totaling 125 feet at those locations of the proposed building. The drilling helped to provide data on the subsurface conditions and samples of soil and rock were also obtained. Water levels were measured in the test borings during and at the completion of drilling. Tetra Tech also performed analyses using test borings.





TROY MINE SUBSIDENCE EVALUATIONS FOR GEOTECHNICAL ASSESSMENT

Libby Montana

CLIENT:
U.S. Forest Service
PROJECT HIGHLIGHTS:
<ul style="list-style-type: none">▪ Subsidence evaluation 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.



CLEAR CREEK / CENTRAL CITY REMEDIATION AND GEOTECHNICAL DESIGN

Gilpin County, Colorado

CLIENT:

Colorado Department of Public Health

PROJECT HIGHLIGHTS:

- Geotechnical design
- Construction documents and administration
- Dam and channel design

Tetra Tech performed professional engineering and surveying services for the planning and design of water quality improvements in the North Clear Creek watershed. The Clear Creek/Central City Superfund Site encompasses many mine waste rock piles dating back to the mid-19th century gold rush days. Abandoned waste rock piles contaminated the watershed with acid mine drainage and contaminated sediments. This project reduces runoff contact with the waste rock, collects sediments for future removal, and provides flood control to Central City and the Town of Black Hawk. Key project elements include:

- Hydraulic and geotechnical design of two rock fill dams with heights exceeding 25 feet
- A soil nail wall with a natural stone veneer to protect Gregory Gulch
- Design of run-on and runoff control ditches to minimize water contact with five waste rock piles
- Stone protection of waste rock pile toes adjacent to the creeks
- Construction observation and administration
- Interfacing with the Colorado Department of Public Health and Environment, the Environmental Protection Agency, and local municipalities
- Iron oxide recovery plan





BANDY AND KING MINE SUBSIDENCE PROJECTS

Norton and Wise, Virginia

CLIENT:

Virginia Department of Mines,
Minerals, and Energy

PROJECT HIGHLIGHTS:

- 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.