

**PROPOSAL FOR ENGINEERING SERVICES  
REQUIRED FOR THE ABATEMENT OF PROBLEMS  
ARISING FROM ABANDONED MINE LANDS**

**Maybeury (Oakley) Landslide  
Design Services  
DEP14439**

*Prepared for:*

**West Virginia Department of Environmental Protection  
Office of Abandoned Mine Lands and Reclamation  
601 57<sup>th</sup> Street SE  
Charleston, West Virginia 25304**

*Prepared by:*

**TERRADON Corporation  
Post Office Box 519  
Nitro, West Virginia 25143  
(304) 755-8291**

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PURCHASING DIVISION  
STATE OF WV

**TERRADON**  
CORPORATION

P.O. Box 519  
Nitro, WV 25143  
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P.O. Box 1635  
Lewisburg, WV 24901  
Tel: (304) 645-4636  
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5310 Markel Road  
Suite 102  
Richmond, VA 23230  
Tel: (804) 673-2560  
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October 27, 2008

Mr. Chuck Bowman, Buyer  
Department of Administration  
Purchasing Division  
2019 Washington Street, East  
Charleston WV 25305-0130

**Re: Expression of Interest  
Maybeury (Oakley) Landslide Design (DEP14439)**

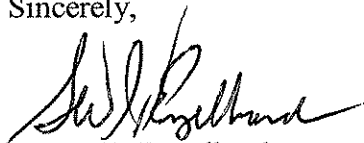
Dear Mr. Bowman:

TERRADON is pleased to submit this Expression of Interest to provide professional engineering services to the WV Department of Environmental Protection, Office of Abandoned Mine Lands and Reclamation (WVDEP/AML) for the Maybeury (Oakley) Landslide design project in McDowell County, West Virginia.

TERRADON routinely provides the required services to WVDEP/AML throughout the state. We have the technical, managerial and financial resources to provide these services at a cost favorable to WVDEP/AML.

We look forward to an opportunity to interview for this project. Should you have any questions regarding the submittal or TERRADON, please do not hesitate to contact me.

Sincerely,



Steven T. Engelhardt  
Director of Marketing & Personnel

# Evaluation Criteria

## A. WV Registered Professional Engineers

TERRADON offers a very professional and experienced staff to perform the tasks required for this project. TERRADON, has been responsible for all aspects of the many successfully completed environmental projects including AML projects.

TERRADON has five West Virginia Registered Professional Civil Engineers located in our Primary office at Rock Branch Industrial Park in Poca, West Virginia. We also have Phillip Reed, PE, located in our Lewisburg, West Virginia office.

**Total** number of WV Registered Professional Engineers (Civil or Mining) in the Primary Office located in Poca, West Virginia.

- |                             |                                  |
|-----------------------------|----------------------------------|
| 1. John James, PE           | Project Manager/Project Engineer |
| 2. William (Bill) White, PE | Project Manager/Project Engineer |
| 3. Tim White, PE            | Project Manager/Project Engineer |
| 4. Jim Nagey, PE            | Project Manager/Project Engineer |
| 5. Bud McCallister, PE      | Project Manager/Project Engineer |

## B. Experience of the WVRPE

Mr. Tim White, P.E., is TERRADON's principal engineer. He brings nearly 20 years of design experience to the project and will serve as Project Manager. He will be assisted by Senior Geotechnical engineer, John James, P.E. who brings a wealth of mine reclamation experience.

TERRADON has extensive experience in both wet and dry mine seals, with or without bat gates. Our recent experience with Stonecoal creek had over two dozen mine seals. In addition, we have done regrading on numerous refuse piles and highwalls including Jenkin Jones, Micajah, Linger, Camp Mahonegan, Cedar Creek, and Tupper's Creek and Gerath Landslides. TERRADON also has experience designing road and bridge upgrades.

# Evaluation Criteria

## Available WV- AML Design Teams

TERRADON has the following personnel available to assign. All persons listed have previous design experience.

### Project Engineers

John James, P.E.  
Tim White, P.E.  
Jim Nagy, P.E.  
William White, P.E.  
Bud McCallister, P.E.

### CAD Designers

Kevin Garnes  
Earl Oldham  
Bill Gerencir  
Kevin Sarrett  
Russ Lester

### Engineer Techs

Bruce Frame  
Larry Jeffery

### Surveyors

Robert Thaw, P.S.  
Dave Brown, P.S.

## Project Management Plan

### Tim White, P.E. - Project Manager/Project Engineer

Mr. White has 18 years of civil engineering design experience including mine reclamation, site development, and highways. He will be responsible for design and preparation of construction bid documents.

### John James, P.E. - Project Engineer

John James, PE, who brings 39 years experience in geotechnical engineering in West Virginia.

### Jim Nagy, P.E. - Project Engineer

Mr. Nagy will be responsible peer review, evaluation, and help with design of the project.

### Bruce Frame - Senior Field Technician

Mr. Frame has over 40 years experience in construction inspection and materials testing. He will be responsible for field investigation, sampling, measurement and other related services.

### William Ratcliffe - Environmental Scientist

Mr. Ratcliffe will be responsible for wetland delineations, wetland design, 401/404 certifications, natural stream design, NPDES and NEPA permits.

## Quality Control/ Cost Control

Mr. Tim White, P.E. will be responsible for all quality control and cost control for the project.

TERRADON would appreciate your consideration to be short-listed so that we may discuss our approach to this project with members of the selection committee.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
CONSULTANT CONFIDENTIAL QUALIFICATION QUESTIONNAIRE

|  |                                      |   |                               |  |
|--|--------------------------------------|---|-------------------------------|--|
| EXPERIENCE DATA  |                                      | DATE (DAY, MONTH, YEAR)<br><b>January 1, 2008</b>   |                               | FEIN<br><b>55-0687626</b>  |
| 1. FIRM NAME<br><b>TERRADON Corporation</b>  |                                      | 2. HOME OFFICE BUSINESS ADDRESS<br><b>401 Jacobson Drive, Poca, WV 25159</b>  |                               | 3. FORMER FIRM NAME  |
| 4. HOME OFFICE TELEPHONE<br><b>(304)-755-8291</b>  | 5. ESTABLISHED (YEAR)<br><b>1989</b> | 6. TYPE OWNERSHIP<br>Individual <input checked="" type="checkbox"/> Corporation<br>Partnership <input type="checkbox"/> Joint-Venture |                               | 6a. WV REGISTERED DBE<br>YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> |
| 7. PRESENT OFFICES: ADDRESS/ TELEPHONE/ PERSON IN CHARGE/ NO. PERSONNEL EACH OFFICE<br><b>401 Jacobson Drive, Poca, WV 25159 / (304)-755-8291 / Thomas Y. Kittredge, President / 42 persons</b><br><b>425 North Jefferson Street, Lewisburg, WV 24901/ (304) 645-4636 / Robert Ridgeway, Branch Manager / 10 persons</b> |                                      |   |                               |  |
| 8. NAMES OF PRINCIPAL OFFICIALS OR MEMBERS OF FIRM<br><b>Thomas Y Kittredge, President</b><br><b>Virginia L. King, CFO</b>   |                                      | 8a. NAME, TITLE, & TELEPHONE NUMBER - OTHER PRINCIPALS<br><b>Timothy T White, P.E. , Principal Engineer</b>                           |                               |  |
| 9. PERSONNEL BY DISCIPLINE   |                                      |   |                               |  |
| <u>5</u> ADMINISTRATIVE  | —                                    | ECOLOGISTS  | <u>5</u> LANDSCAPE ARCHITECTS | <u>1</u> STRUCTURAL ENGINEERS  |
| — ARCHITECTS   | —                                    | ECONOMISTS  | — MECHANICAL ENGINEERS        | <u>10</u> SURVEYORS  |
| <u>2</u> CADD OPERATORS  | —                                    | ELECTRICAL ENGINEERS  | — MINING ENGINEERS            | — TRAFFIC ENGINEERS  |
| — CHEMICAL ENGINEERS   | <u>2</u>                             | ENVIRONMENTALISTS   | — PHOTOGRAMMETRISTS           | <u>1</u> TRANSPORTATION ENGINEERS  |
| <u>5</u> CIVIL ENGINEERS   | —                                    | ESTIMATORS  | — PLANNERS: URBAN/REGIONAL    | <u>3</u> OTHER   |
| <u>8</u> CONSTRUCTION INSPECTORS   | —                                    | GEOLOGISTS  | <u>1</u> SANITARY ENGINEERS   |  |
| <u>1</u> DESIGNERS, HIGHWAY  | —                                    | HISTORIANS  | <u>1</u> SOILS ENGINEERS      |  |
| — DRAFTSMEN  | —                                    | HYDROLOGISTS  | — SPECIFICATION WRITERS       |  |
|  |                                      |   |                               | <u>52</u> TOTAL PERSONNEL  |

10. TOTAL NUMBER OF WV REGISTERED PROFESSIONAL ENGINEERS IN PRIMARY OFFICE: **6**

\*RPEs other than Civil and Mining must provide supporting documentation that qualifies them to supervise this type of work.

11. OUTSIDE KEY CONSULTANTS/ASSOCIATES ANTICIPATED TO BE USED. Attach "Consultant Confidential Qualification Questionnaire" for each if copy is not on file with AML.

| NAME AND ADDRESS   | SPECIALTY                             | WORKED WITH BEFORE   |
|--|---------------------------------------|--|
| <b>Triad Engineering</b><br>4980 Teays Valley Road<br>Scott Depot WV 25560 | <b>Drilling, Soils Lab</b>            | <input checked="" type="checkbox"/> YES<br><input type="checkbox"/> NO |
| <b>Bio-Chem Testing, Inc.</b><br>PO Box 634<br>Teays WV 25569              | <b>Water Lab</b>                      | <input checked="" type="checkbox"/> YES<br><input type="checkbox"/> NO |
| <b>Photo Science</b><br>2670 Willhite Drive<br>Lexington, KY 40503         | <b>Aerial Photogrammetric Mapping</b> | <input checked="" type="checkbox"/> YES<br><input type="checkbox"/> NO |

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

X YES Description and Number of Projects: **35 projects for WVDEP/AML&R**

— NO

B. Is your firm experienced in Soil Analysis?

X YES Description and Number of Projects: **24 WVDEP/AML&R projects included some soil analysis, and nearly all projects for the last 5 years have included soils analysis for various purposes.**

— NO

C. Is your firm experienced in hydrology and hydraulics?

X YES Description and Number of Projects: **24 WVDEP/AML&R projects included hydrology and hydraulics and nearly all projects for the last 5 years have included hydrology and hydraulics.**

— NO

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

— YES Description and Number of Projects:

X NO **We routinely provide photo control surveys and field edit the mapping provided.**

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

X YES Description and Number of Projects: **9 WVDEP/AML&R projects included the evaluation of aquifer degradation as a result of mining. Four of those projects have been designed and constructed. TERRADON has also designed hundreds of miles of waterline in the last 5 years.**

— NO

F. Is your firm experienced in Acid Mine Drainage?

X YES Description and Number of Projects: **5 WVDEP/AML&R projects included acid mine drainage evaluation and abatement. In addition, TERRADON was 1 of only 2 firms evaluating and designing AMD abatement of special reclamation projects in 1992, 1993 and 1994.**

— NO

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 Initial)<br><b>James, John W., P.E.<br/>Project Manager</b> | YEARS OF EXPERIENCE                         |  |   |
|---|---|--|---|
|   | YEARS OF AML DESIGN EXPERIENCE:<br><b>7</b> | YEARS OF AML RELATED DESIGN EXPERIENCE:<br><b>27</b> | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE<br><b>7</b> |

Brief Explanation of Responsibilities  
**Geotechnical Project Manager for TERRADON Corporation. Responsible for contract administration and project management; peer review of design, construction drawings and specifications; constructability review and construction cost estimate. Responsible for resource management to assure project schedule and cost.**

EDUCATION (Degree, Year, Specialization)  
**B.S., 1968, Civil Engineering**

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS  
**American Society of Civil Engineers (Past President, WV Section)**

REGISTRATION (Type, Year, State)  
**P.E., 1973, WV**

| NAME (Last, First, Middle Initial)<br><b>White, William, P.E.<br/>Senior Structural Engineer</b> | YEARS OF EXPERIENCE                         |  |   |
|--|---|--|---|
|  | YEARS OF AML DESIGN EXPERIENCE:<br><b>2</b> | YEARS OF AML RELATED DESIGN EXPERIENCE:<br><b>18</b> | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE<br><b>0</b> |

Brief Explanation of Responsibilities  
**Senior engineer responsible for structural analysis, design engineering, field investigation, specification writing, engineer's cost estimate, prebid and preconstruction meetings. Experienced in retaining wall design.**

EDUCATION (Degree, Year, Specialization)  
**B.S., 1987, Civil Engineering**

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS  
**American Society of Civil Engineers**

REGISTRATION (Type, Year, State)  
**P.E., 1997, WV; P.E., 1996, OH; P.E., 1999, VA; P.E., 2000, FL; P.E., 2000, NC; P.E., 2000, AR; P.E., 2001, KY**

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| 13. PERSONAL HISTORY STATEMENT OF PRINCIPALS AND ASSOCIATES RESPONSIBLE FOR AML PROJECT DESIGN (Furnish complete data but keep to essentials.)  |                                 |   |   |
|---|---------------------------------|---|---|
| NAME (Last, First, Middle Initial)  | YEARS OF EXPERIENCE             |   | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE |
|   | YEARS OF AML DESIGN EXPERIENCE: | YEARS OF AML RELATED DESIGN EXPERIENCE: |   |
| <b>White, Timothy T., P.E.<br/>Civil Engineer, Project Manager</b>  | <b>2</b>                        | <b>15</b>                               | <b>0</b>                                      |
| Brief Explanation of Responsibilities<br><b>Project Engineer responsible for grading, hydraulic design, erosion and sediment control, natural stream channel assessment and design.</b>               |                                 |   |   |
| EDUCATION (Degree, Year, Specialization)<br><b>B.S., 1992, Civil Engineering</b>  |                                 |   |   |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>American Society of Civil Engineers</b>  |                                 |   |   |
| REGISTRATION (Type, Year, State)<br><b>P.E. 1999, OH; P.E. 1999, WV; P.E. 2001, AR; P.E. 2002, KY; P.E. 2003, TX; P.E. 12006, VA; P.E. 2007, PA</b>   |                                 |   |   |
| NAME (Last, First, Middle Initial)  | YEARS OF EXPERIENCE             |   | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE |
|   | YEARS OF AML DESIGN EXPERIENCE: | YEARS OF AML RELATED DESIGN EXPERIENCE: |   |
| <b>Miller, Jennifer J., P.E.<br/>Civil Engineer, Project Engineer</b>   | <b>2</b>                        | <b>0</b>                                | <b>7</b>                                      |
| Brief Explanation of Responsibilities<br><b>Project Engineer responsible for hydrologic studies, hydraulic design, erosion and sediment control, water distribution modeling and water treatment.</b> |                                 |   |   |
| EDUCATION (Degree, Year, Specialization)<br><b>B.S., 1985, Civil Engineering</b>  |                                 |   |   |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>P.E., 1990, MO; P.E., 1992, WV; P.E., 2007, VA</b>   |                                 |   |   |

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

| NAME (Last, First, Middle Initial)   | YEARS OF EXPERIENCE             |   |   |
|--|---------------------------------|---|---|
|  | YEARS OF AML DESIGN EXPERIENCE: | YEARS OF AML RELATED DESIGN EXPERIENCE: | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE |
| <b>Nagey, James A., P.E.</b><br><b>Civil Engineer</b>  | <b>2</b>                        | <b>0</b>                                | <b>23</b>                                     |
| Brief Explanation of Responsibilities<br><b>He specializes in the design of water treatment and distribution systems.</b>  |                                 |   |   |
| EDUCATION (Degree, Year, Specialization)<br><b>B.S., 1974, Civil Engineering Technology</b>  |                                 |   |   |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>P.E., 1982, WV</b>  |                                 |   |   |
| NAME (Last, First, Middle Initial)<br><b>McCallister, Harvey "Bud", P.E.</b><br><b>Civil Engineer</b>  |                                 |   |   |
| YEARS OF AML DESIGN EXPERIENCE: <b>0</b>   |                                 |   |   |
| YEARS OF AML RELATED DESIGN EXPERIENCE: <b>0</b>   |                                 |   |   |
| YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE: <b>30</b>   |                                 |   |   |
| Brief Explanation of Responsibilities<br><b>More than 30 years of experience in planning, design, funding, permitting, and construction management of water and wastewater projects throughout West Virginia</b> |                                 |   |   |
| EDUCATION (Degree, Year, Specialization)<br><b>B.S., 1969, Civil Engineering</b><br><b>M.S., 1972, Sanitary Engineering</b>  |                                 |   |   |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>P.E., 1976, WV; P.E., 2006, OH</b>  |                                 |   |   |

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

| NAME (Last, First, Middle Initial)  |  | YEARS OF EXPERIENCE   |  |
|---|--|---|--|
| <b>Thaw, Robert F., P.S.</b><br><b>Principal Surveyor</b>   |  | YEARS OF AML DESIGN EXPERIENCE:<br><b>13</b>  | YEARS OF AML RELATED DESIGN EXPERIENCE:<br><b>13</b> |
| YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:<br><b>22</b>   |  | Brief Explanation of Responsibilities<br><b>Responsible for all aspects of surveying including photogrammetry control, if required, field editing of mapping, topographic mapping, establishment of survey control monuments and establishing base lines for construction layout and quantity measurement. Also, tax map overlays and detailed property clarifications.</b> |  |
| EDUCATION (Degree, Year, Specialization)<br><b>B.A., 1981, Surveying Technology</b><br><b>B.S., 1985, Surveying</b> |  |   |  |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>West Virginia Association of Land Surveyors</b>                      |  | REGISTRATION (Type, Year, State)<br><b>P.S. 1993, WV</b>  |  |
| NAME (Last, First, Middle Initial)  |  | YEARS OF EXPERIENCE   |  |
| <b>Brown, David A., P.S.</b><br><b>Professional Surveyor</b>  |  | YEARS OF AML DESIGN EXPERIENCE:<br><b>5</b>   | YEARS OF AML RELATED DESIGN EXPERIENCE:<br>          |
| YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:<br>  |  | Brief Explanation of Responsibilities<br><b>Responsible for all aspects of surveying including photogrammetry control, if required, field editing of mapping, topographic mapping, establishment of survey control monuments and establishing base lines for construction layout and quantity measurement. Also, tax map overlays and detailed property clarifications.</b> |  |
| EDUCATION (Degree, Year, Specialization)<br><b>B.S., 1996, Engineering Technology</b>                               |  |   |  |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br><b>West Virginia Association of Land Surveyors</b>                      |  | REGISTRATION (Type, Year, State)<br><b>P.S. 2003, WV</b>  |  |

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

|   |   |   |   |
|---|---|---|---|
| NAME (Last, First, Middle Initial)<br><b>Bakanas, Brian<br/>Professional Surveyor</b> | YEARS OF EXPERIENCE                         |   |   |
|   | YEARS OF AML DESIGN EXPERIENCE:<br><b>7</b> | YEARS OF AML RELATED DESIGN EXPERIENCE: | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE |

Brief Explanation of Responsibilities  
**Field survey and office computations for field editing of mapping, topographic surveys, and establishing base lines for construction layout and quantity measurement. Tax map overlay and boundary surveys.**

EDUCATION (Degree, Year, Specialization)  
**A.S., 1985, Surveying**

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

REGISTRATION (Type, Year, State)  
**P.S. 1996, WV**

|   |   |   |   |
|---|---|---|---|
| NAME (Last, First, Middle Initial)<br><b>Fox, Gregory D., ASLA<br/>Land Development Manager</b> | YEARS OF EXPERIENCE                         |   |   |
|   | YEARS OF AML DESIGN EXPERIENCE:<br><b>2</b> | YEARS OF AML RELATED DESIGN EXPERIENCE:<br><b>14 (Grading &amp; Design)</b> | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE<br><b>0</b> |

Brief Explanation of Responsibilities  
**Responsible for grading and drainage plans.**

EDUCATION (Degree, Year, Specialization)  
**B.S., 1988, Landscape Architecture  
 B.A., 1994, Geography (Planning)**

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS  
**American Society of Landscape Architects  
 WV Chapter ASLA  
 Associate Member AIA West Virginia**

REGISTRATION (Type, Year, State)  
**Landscape Architect: 1991-OH, 1992-WV, 1993-KY,  
 1997-SC, 1997-NC, 2002-VA**

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

|   |  |                                       |   |  |
|---|--|---------------------------------------|---|--|
| NAME (Last, First, Middle Initial)<br><b>Gerencir, William</b><br><b>Designer, CADD Technician</b>  |  | YEARS OF AML DESIGN EXPERIENCE:<br>14 | YEARS OF AML RELATED DESIGN EXPERIENCE:<br>14 | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:<br>14 |
| Brief Explanation of Responsibilities<br><b>Design tasks include: drainage calculations consisting of hydrology and hydraulic calculations. Earthworks including (conceptual) site design, site grading and site balance, project coordination, coordination of all design drawing, Quality Control, and calculation brief, writing of specifications. Site work including surveying and site reconnaissance. Erosion and sediment control design. Environmental permits.</b> |  |                                       |   |  |
| EDUCATION (Degree, Year, Specialization)<br><b>A.S., 1991, Civil Surveying Engineering Technology</b>   |  |                                       |   |  |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br>REGISTRATION (Type, Year, State)  |  |                                       |   |  |
| NAME (Last, First, Middle Initial)<br><b>Garnes, Kevin, D.</b><br><b>Senior Designer/CADD Technician</b>  |  | YEARS OF AML DESIGN EXPERIENCE:<br>14 | YEARS OF AML RELATED DESIGN EXPERIENCE:<br>14 | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:<br>25 |
| Brief Explanation of Responsibilities<br><b>CADD Support: Site design, site grading and site balance. Design drawings and Quality Control. Field reconnaissance and layout of waterline feasibility studies and final design.</b>   |  |                                       |   |  |
| EDUCATION (Degree, Year, Specialization)  |  |                                       |   |  |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br>REGISTRATION (Type, Year, State)  |  |                                       |   |  |
| NAME (Last, First, Middle Initial)<br><b>Ratcliffe, William M.</b><br><b>Environmental Scientist</b>  |  | YEARS OF AML DESIGN EXPERIENCE:<br>0  | YEARS OF AML RELATED DESIGN EXPERIENCE:<br>3  | YEARS OF DOMESTIC WATERLINE DESIGN EXPERIENCE:<br>0  |
| Brief Explanation of Responsibilities<br><b>Wetland delineations, design, permits, 401/404 certifications. Natural stream design, NPDES permits, NEPA permits and reports.</b>  |  |                                       |   |  |
| EDUCATION (Degree, Year, Specialization B.A., 2003, Environmental Geo-Science)  |  |                                       |   |  |
| MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS<br>REGISTRATION (Type, Year, State)  |  |                                       |   |  |

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

Software

Autodesk 2007 Land Development Desktop with Civil and Survey Design Modules

SedCad 4 - Erosion Control and Hydrology Software

Haested Method Flowmaster Software for Channel Design

Haested Methods – Water CADD (Pipe Network Analysis)

Slope Stability -

PC Stable

REAMM

SBSLOPE

WinStable and WinStable 2003

Piling Walls, Anchors and Reinforced Earth Walls -

Lpile

HelicAP

Anchor 400

KeyWall 2004

TR 55, TR 20, TR 66 (Sites) - Hydrology

Hec-1, Hec HMS 2.22, Hec R As 3.1.2 – Hydrology

LC 58 + RP 61 – Structural (wall)

Microstation V8

Surveying Equipment

Trimble 4700 modular, RTK Global Positioning Total Station

Trimble Geomatics Office Software

Topcon Total Stations (3)

SMI Data Collectors (3)

Printing/Plotting/Reproduction

HP DesignJet 1050C Plotter

HP DesignJet 759C Plotter

HP LaserJet 8000 Printer (2)

HP Color LaserJet 3700

Sharp AR-550 Copier/Printer (2)

Sharp AR-C150 Full Color Copier/Printer

Océ 7056 Engineering Size Copier

15. PRESENT ACTIVITIES ON WHICH YOU ARE THE DESIGNATED ENGINEER OF RECORD

| PROJECT NAME, TYPE AND LOCATION   | NAME AND ADDRESS OF OWNER   | ESTIMATED CONSTRUCTION COST | PERCENT COMPLETE |
|---|---|-----------------------------|------------------|
| Sawmill Village Development<br>Site/civil Design,<br>Snowshoe, West Virginia          | Summit III, LLC<br>295 Seven Farms Drive<br>Charleston, WV 29492                          | \$100,000,000               | 50%              |
| WV Route 2<br>Water Line Extensions<br>Huntington, West Virginia                      | West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327                        | \$450,000                   | 0%               |
| New Hope<br>1 MG Water Storage Tank<br>New Hope, West Virginia                        | West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327                        | \$600,000                   | 99%              |
| Salt Rock PSD Water Main<br>Extensions<br>Salt Rock, West Virginia                    | Salt Rock PSD & Cabell County<br>Commission<br>Huntington, West Virginia                  | \$2,000,000                 | 50%              |
| Derrick Creek<br>Water Line Extensions<br>Sissonville, West Virginia                  | West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327                        | \$1,500,000                 | 0%               |
| Charleston Replacement Housing<br>Site/Civil for CRH 1-5<br>Charleston, West Virginia | Alan Ives Construction<br>10 South La Salle Street, Suite 3440<br>Chicago, Illinois 60603 | \$20,000,000                | 50%              |
| Putnam County 2006 Water Main<br>Extensions,<br>Putnam County, West Virginia          | Putnam County Commission<br>3389 Winfield Road<br>Winfield, WV 25213                      | \$3,300,000                 | 98%              |

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15. PRESENT ACTIVITIES ON WHICH YOU ARE THE DESIGNATED ENGINEER OF RECORD

| PROJECT NAME, TYPE AND LOCATION   | NAME AND ADDRESS OF OWNER  | ESTIMATED CONSTRUCTION COST | PERCENT COMPLETE |
|---|--|-----------------------------|------------------|
| Fort Lee Hydraulic Study, Water Line Extensions, and New Fuel Tanks Hope Well, Virginia | Virginia American Water Company<br>900 Industrial Street<br>Hopewell, VA 23860     | \$450,000                   | 99%              |
| Fairmont Water Park<br>Fairmont, West Virginia  | City Fairmont<br>200 Jackson Street<br>Fairmont, West Virginia 26554               | \$3,000,000                 | 90%              |
| Yeager Airport<br>Parking Deck<br>Charleston, West Virginia                             | BBL Carlton<br>PO Box 1153<br>Charleston, WV 25324                                 | \$3,000,000                 | 15%              |
| Relocate CR 18,<br>Eccles, Raleigh County,<br>West Virginia                             | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305 | \$2,000,000                 | 80%              |
| Sleeths Run Bridge CR119/1<br>Lewis County<br>West, Virginia                            | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305 | \$2,000,000                 | 20%              |
| 44 Various Cell Tower Sites<br>Throughout West Virginia                                 | NTelos<br>1150 Shenandoah Village Drive<br>Waynesboro, VA 22980                    | \$3,000,000                 | 25%              |

TOTAL NUMBER OF PROJECTS: 13

TOTAL ESTIMATED CONSTRUCTION COSTS: \$141,300,000



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

| PROJECT NAME, TYPE AND LOCATION  | NATURE OF FIRMS RESPONSIBILITY | NAME AND ADDRESS OF OWNER   | ESTIMATED COMPLETION DATE | ESTIMATED CONSTRUCTION COST |                           |
|--|--------------------------------|---|---------------------------|-----------------------------|---------------------------|
|  |                                |   |                           | ENTIRE PROJECT              | YOUR FIRMS RESPONSIBILITY |
| Mingo Central High Sch<br>Mingo County, West Virginia                        | Civil, Site Design, Surveying  | Mingo County BOE<br>Sycamore Street<br>Williamson, WV 25661                           | 2008                      | \$20,000,000                | 15%                       |
| Marshall Community & Technical College<br>Huntington, West Virginia          | Civil, Site Design, Surveying  | Marshall University<br>Facilities Planning & Management,<br>Huntington, WV            | 2009                      | \$20,000,000                | 15%                       |
| New Teays Elementary<br>Scott Depot, West Virginia                           | Civil, Site Design, Surveying  | Putnam County BOE<br>Winfield, WV 25213   | 2008                      | \$12,000,000                | 15%                       |
| Moorefield Intermediate School<br>Moorefield, West Virginia                  | Civil, Site Design, Surveying, | Hardy County BOE<br>510 Ashby Street<br>Moorefield, WV 26836                          | 2009                      | \$12,000,000                | 15%                       |
| Marshall University, Health & Wellness Center, Dormitories<br>Huntington, WV | Civil, Site Design, Hardscape  | Marshall University<br>Facilities Planning & Management,<br>Huntington, WV            | 2008                      | \$27,000,000                | 10%                       |
| Twin Falls State Park Lodge Expansion<br>McDowell County, WV                 | Civil, Site Design             | WV Division of Natural Resources,<br>Capitol Building 3, R663<br>Charleston, WV 25305 | 2008                      | \$5,500,000                 | 15%                       |
| University High School<br>Monongalia County, WV                              | Civil, Site Design             | Monongalia County Schools,<br>668 River Rd<br>Morgantown, WV 26507                    | 2008                      | \$12,000,000.00             | 20%                       |

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) |
|--|---|-----------------------------|------|-------------------------|
| US 35 Value Engineering, Ramp 1, WV 34 Interchange Putnam County, West Virginia                      | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305                            | Saving \$3,000,000          | 2007 | Yes                     |
| Gypsy Bridge S317-19-23.25 00<br>Erection Plans<br>Harrison County, West Virginia                    | Bilco Construction Company, Inc.<br>805 Wisteria Drive<br>South Charleston, WV 25309                          | \$ 20,000 fee               | 2008 | Under Construction      |
| South Branch Potomac River Bridge, X316-H-100.40 04<br>Erection Plans<br>Hardy County, West Virginia | Vecellio & Grogan, Inc.<br>P.O. Box 2438<br>Beckley, WV 25902   | \$31,000,000                | 2008 | Under Construction      |
| WV 73 Turning Lanes<br>Fountain Place Development<br>Logan County, West Virginia                     | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305                            | \$ 600,000                  | 2005 | Yes                     |
| Sedalia Arch Bridge, Bridge Replacement<br>Sedalia, West Virginia                                    | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305                            | \$890,000                   | 2006 | Yes                     |
| Fairmont Coke Works Redevelopment<br>Traffic Study,<br>Fairmont, West Virginia                       | City Fairmont<br>200 Jackson Street<br>Fairmont, West Virginia 26554  | \$20,000 fee                | 2006 | No                      |
| St. Mary's (WV 16) Bypass<br>Route Study<br>Pleasants County, WV                                     | WV DOT<br>Building 5, Room A-110<br>1900 Kanawha Blvd. East<br>Charleston WV 25305                            | \$120,000 fee               | 2004 | Study                   |
| Hinton Landslide, Landslide Reclamation<br>Hinton, West Virginia                                     | WV DOT, Division of Highways<br>Building 5, Room A-110<br>1900 Kanawha Boulevard East<br>Charleston, WV 25305 | \$1,000,000                 | 2006 | Yes                     |

Continued on next page

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) |
|---|--|-----------------------------|------|-------------------------|
| Corridor L Widening Design<br>US Route 19<br>Summersville, West Virginia              | WVDOT, Division of Highways<br>Building 5, Room A-110<br>1900 Kanawha Boulevard East<br>Charleston, WV 25305 | \$12,100,000                | 2005 | N o                     |
| Upper Fishers Branch/Guthrie<br>Water Main Extension<br>Kanawha County, West Virginia | West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327   | \$2,800,000                 | 2008 | Under Const.            |
| Upper Frame Phase 2<br>Water Main Extension<br>Kanawha County, West Virginia          | Kanawha County RDA &<br>West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327                   | \$2,100,000                 | 2008 | Under Const.            |
| Tucker County Landfill<br>Expansion Design of Cell 6<br>Thomas, West Virginia         | Tucker County Solid Waste<br>Authority<br>PO Box 58<br>Thomas WV 26292                                       | \$2,500,000                 | 2007 | Yes                     |
| Montgomery Wastewater<br>Treatment Plant Upgrade, Design<br>Montgomery, West Virginia | City of Montgomery<br>706 3 <sup>rd</sup> Avenue<br>Montgomery WV 25136                                      | \$2,800,000                 | 2009 | Under Const.            |
| Back Fork Water Main Extension<br>Webster County, West Virginia                       | West Virginia American Water<br>PO Box 1906<br>Charleston WV 25327   | \$800,000                   | 2008 | Under Const.            |
| Rabel Mountain Water Main<br>Extensions<br>Kanawha County, West Virginia              | WV American Water<br>PO Box 1906<br>Charleston WV 25327  | \$600,000                   | 2007 | Yes                     |
| Fort Lee Water Distribution<br>System<br>Upgrade<br>Fort Lee, Virginia                | WV American Water<br>PO Box 1906<br>Charleston WV 25327  | \$1,000,000                 | 2006 | Yes                     |

Continued on next page

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) |
|--|--|-----------------------------|------|-------------------------|
| Prince Williams 1 Million Gallon Elevated Water Storage Tank<br>Prince Williams County, Virginia | WV American Water<br>PO Box 1906<br>Charleston WV 25327              | \$1,500,000                 | 2006 | Yes                     |
| Hickory Ridge Water Storage Tank Relocation,<br>County, West Virginia                            | WV American Water<br>PO Box 1906<br>Charleston WV 25327              | \$1,000,000                 | 2006 | Yes                     |
| Winfield High School Expansion<br>Winfield, West Virginia  | Putnam County BOE<br>Winfield, WV 25213                              | \$2,000,000                 | 2006 | Yes                     |
| Fountain Place Mall Phase 2 Site/Civil Design<br>Logan, West Virginia                            | Fountain Place Mall<br>PO Box 794<br>Logan, WV 25601                 | \$10,000,000                | 2005 | Yes                     |
| Jenkin Jones Refuse Piles Mine Reclamation<br>McDowell County, West Virginia                     | WVDEP/AML&R<br>601 57 <sup>TH</sup> Street SE<br>Charleston WV 25304 | \$4,000,000                 | 2005 | Yes                     |
| Bendale Dam Repair Design<br>Lewis County, West Virginia   | WV American Water<br>PO Box 1906<br>Charleston WV 25327              | \$100,000                   | 2005 | Yes                     |
| RDA of Charleston Olcott Water Study<br>Kanawha County   | WVDEP/AML&R<br>601 57 <sup>TH</sup> Street SE<br>Charleston WV 25304 | \$50,000                    | 2004 | Study                   |
| Stonecoal Creek Complex Refuse AML&R<br>Raleigh County   | WVDEP/AML&R<br>601 57 <sup>TH</sup> Street SE<br>Charleston WV 25304 | \$4,000,000                 | 2004 | Yes                     |
| Pond Gap Waterline Extension<br>Kanawha County   | WV American Water/RDA of<br>Charleston-Kanawha Co.                   | \$2,000,000                 | 2004 | Yes                     |
| Tri-State Gaming Parking Expansion<br>Commercial Site Development<br>Kanawha County              | Tri-State Gaming Center<br>PO Box 7118<br>Cross Lanes WV 25356       | \$1,500,000                 | 2004 | Yes                     |
| Union Ridge Waterline Extension<br>Cabell County   | WV American Water/RDA of<br>Charleston-Kanawha Co.                   | \$2,000,000                 | 2004 | Yes                     |

Continued on next page

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) |
|--|--|-----------------------------|------|-------------------------|
| Witcher Creek Water Line Design                                    | WV American Water<br>PO Box 1906<br>Charleston WV 25327                          | \$550,000                   | 2004 | Yes                     |
| Southridge Expansion Commercial Site Development Kanawha County    | RidgeLine, Inc.<br>400 Second Avenue<br>So. Charleston, WV 25303                 | \$8,000,000                 | 2003 | Yes                     |
| Home Depot Commercial Site Development Kanawha County              | Ridge Line, Inc.<br>400 Second Avenue<br>So. Charleston, WV 25303                | \$2,000,000                 | 2003 | Yes                     |
| WV Osteopathic Medical School, Site Development, Greenbrier County | WV School of Osteopathic Medicine<br>400 North Lee Street<br>Lewisburg, WV 24901 | \$50,000                    | 2003 | Yes                     |
| Toyota Wetland Wetland Mitigation Putnam County                    | Toyota Motor Corporation of WV, Inc.<br>1 Sugar Maple Lane<br>Buffalo, WV 25033  | \$120,000                   | 2003 | Yes                     |
|  |  |                             |      |                         |
|  |  |                             |      |                         |
|  |  |                             |      |                         |

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 AS 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          |
|---|--|--|------|-------------------------|-------------------------------|
| Fairmont State University<br>Campus Improvements<br>Fairmont, West Virginia                 | Fairmont State University<br>1201 Locust Avenue<br>Fairmont, WV 26554          | \$1,000,000  | 2007 | Yes                     | Omni Associates               |
| New Teays Elementary<br>Civil, Site Design, Surveying<br>Scott Depot, West Virginia         | Putnam County BOE<br>Winfield, WV 25213  | \$1,000,000  | 2008 | Yes                     | Williamson Shriver Architects |
| Mountain State University<br>Health Science Building<br>Civil/Site/Surveying<br>Beckley, WV | Mountain State University<br>P O Box 9003<br>Beckley, WV 25802-9003            | \$1,500,000  | 2007 | Yes                     | Dan Sneed Architects          |
| WVU Recreation Center<br>Master Plan<br>Morgantown, WV                                      | West Virginia University   | \$2,000,000  | 2006 | No                      | Omni Associates               |
| Doddridge County High School<br>Doddridge County, West Virginia                             | Doddridge County BOE<br>104 Sistersville Pike<br>West Union, WV 26456          | \$1,500,000  | 2006 | Yes                     | Williamson Shriver Architects |
| Capon Bridge<br>Intermediate School<br>Hampshire County, West Virginia                      | Hampshire County BOE<br>46 South High Street<br>Romney, WV 26757               | \$1,000,000  | 2006 | Yes                     | Williamson Shriver Architects |
| Fairmont Public Safety<br>Building, Fairmont, West Virginia                                 | City Fairmont<br>200 Jackson Street<br>Fairmont, West Virginia<br>26554        | \$4,000,000  | 2005 | Yes                     | Omni Associates               |
| Jefferson High School<br>Jefferson County, West Virginia                                    | Jefferson County Schools<br>110 Mordington Ave.<br>Charles Town, WV 25414      | \$2,000,000  | 2005 | No                      | Helbing Lipp, Ltd.            |
| Lincoln County 911 Center<br>Civil, Site Design<br>Lincoln County, WV                       | Lincoln County Commission<br>Courthouse Offices<br>Hamlin, West Virginia 25523 | \$400,000  | 2004 | Yes                     | Omni Associates               |

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 AS 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                |
|--|---|--|------|-------------------------|-------------------------------------|
| WVDEP Headquarters Building, Site/Civil, Survey Kanawha County, WV | WVDEP<br>601 57 <sup>th</sup> Street SE<br>Charleston WV 25304            | \$30,000,00.00                                     | 2004 | Yes                     | BBL-Carlton                         |
| Grafton High School Civil, Site Design Grafton, WV                 | Taylor Co. BOE<br>1 Prospect Street<br>Grafton WV 26354                   | \$1,000,000  | 2004 | Yes                     | Williamson Shriver Architects, Inc. |
| Fairmont Middle School Civil, Site Design Fairmont, WV             | Marion Co. BOE<br>200 Gaston Avenue<br>Fairmont WV 26554                  | \$1,600,000  | 2004 | Yes                     | Omni Associates                     |
| Kanawha Co. 911 Civil, Site Design Kanawha Co., WV                 | Kanawha County Commission<br>407 Virginia Street E<br>Charleston WV 25301 | \$800,000  | 2004 | Yes                     | Kreps & Kreps                       |
| WV Parking Garage, Site Plan, Geotech Charleston, WV               | WV Public Service Commission<br>201 Brooks Street<br>Charleston, WV 25301 | \$500,000.00                                       | 2003 | Yes                     | Associated Architects               |


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.

Tim White, P.E.; is TERRADON Corporation's Principal Engineer. He has nearly 20 years of civil engineering design and construction experience and will serve as Project manager for this project. He is transportation and reclamation department manager for TERRADON and specializes in the design of mining reclamation, roadways/highways, site drainage, and site grading.

Mr. John James, P.E., is a senior geotechnical engineer with TERRADON. He brings over 39 years of soils and reclamation design experience to the project and will serve as Project Engineer.

TERRADON has designed regrading on numerous West Virginia AML refuse piles and including Jenkin Jones, Micajah, Linger, Camp Mahonegan, Cedar Creek, Tappers Creek, and Gerath Landslides. Also, we have designed the regrading for numerous other private projects, with great emphasis on providing balanced projects.

20. The foregoing is a statement of facts.

Signature: 

Printed Name: Steven T. Engelhardt

Title: Director of Marketing & Personnel

Date: September 17, 2008

**Maybeury (Oakley) Landslide  
Design Services  
DEP14439**

| TERRADON AML and RELATED PROJECT EXPERIENCE MATRIX |                                       |   |                                       |                                    |                      |                                      |                     |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   |              |
|--|---------------------------------------|---|---------------------------------------|------------------------------------|----------------------|--------------------------------------|---------------------|-------------------------------|--|-----------------------------|------------------------|--|---------------------------------------|-----------------|--------------------------------|---|------------------------|-----------------|------------------|---------------|-------------------|--------------|
| PROJECT NAME                                       | Exp. Basis<br>C=Corp.<br>P=Personal * | Additional<br>Info<br>Provided in<br>Section (s) ** | PROJECT EXPERIENCE                    |                                    |                      |                                      |                     |                               |  |                             |                        |  |                                       |                 |                                | PRIMARY STAFF PARTICIPATION/CAPACITY<br>M=Management P=Professional *** |                        |                 |                  |               |                   |              |
|  |                                       |   | Abandoned Surface Mine<br>Reclamation | Abandoned Deep Mine<br>Reclamation | Portal/Shaft Closure | Hydrologic/Hydraulic<br>Design/Eval. | Remining Evaluation | Mine/Refuse Fire<br>Abatement | Subsidence Investigation<br>Mitigation | Hazardous Waste<br>Disposal | Project Specifications | Water Quality<br>Evaluation/Mitigation/<br>Replacement | Construction<br>Inspection/Management | Water Treatment | Equipment/Structure<br>Removal | Stream Restoration  | Geotechnical/Stability | Tim White, P.E. | John James, P.E. | Bill Gerencic | Robert Thaw, P.S. | Kevin Gaines |
| Roaring Creek                                      | C/P                                   | No  | X                                     |                                    |                      |                                      |                     |                               |  |                             |                        |  |                                       |                 |                                |   | M/P                    | D               | P                | P             | P                 |              |
| Stonecoal Creek Complex                            | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   | M/P                    | P               | P                | P             | P                 |              |
| Stonecoal Creek Complex #2                         | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        | M/P             | P                | P             | P                 |              |
| Stonecoal Creek Complex #3                         | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        | M/P             | M/P              | M/P           | M/P               |              |
| Jenkin Jones                                       | C/P                                   | yes   | X                                     | X                                  |                      |                                      | X                   | X                             |  |                             |                        |  |                                       |                 |                                |   | M/P                    |                 |                  |               |                   | P            |
| Micajah Refuse Pile                                | C/P                                   | yes   | X                                     | X                                  |                      |                                      | X                   | X                             |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Carswell Hollow (Smith) Refuse                     | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Cedar Creek Refuse                                 | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Spring Branch Burning Refuse<br>Pile               | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Grass Run Refuse (Award<br>Winner)                 | C/P                                   | yes   | X                                     | X                                  |                      |                                      | X                   | X                             |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Black Wolfe Refuse                                 | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |
| Lower Burning Creek Refuse                         | C/P                                   | yes   |                                       | X                                  |                      |                                      | X                   |                               |  |                             |                        |  |                                       |                 |                                |   |                        |                 |                  |               |                   | P            |

\* List whether project experience is corporate or personal 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.





# **STONECOAL CREEK COMPLEX**

The Stonecoal Creek Complex project is located along Stonecoal Creek, near the community of Lillybrook, in southern Raleigh County. The site consists of numerous coal refuse piles and open mine portals, which occupy approximately sixty-six acres of conglomerate land area. All the refuse piles have areas of steep, unstable slopes; they are the primary source of a very high sediment load to Stonecoal Creek. The subsequent sediment deposits in Stonecoal Creek have resulted in a significant reduction of the flow-carrying capacity of Stonecoal Creek, resulting in more frequent flooding of adjacent areas. The open mine portals are easily accessible and represent a significant life safety hazard from roof falls, potential deadly gases, and other hazards.

The purpose of this reclamation program is to regrade the refuse piles to stable slopes, provide proper stabilization with vegetative cover and permanent drainage channel improvements, and seal open mine portals. Generally, the refuse piles will be regraded to stable slopes and permanent drainage patterns will be established, relocating portions of Stonecoal Creek where necessary. Where refuse piles toe into the creek, stream bank protection will be provided. The open mine portals will be closed with an appropriate mine seal. All disturbed areas will be revegetated or otherwise stabilized with structural methods.

CORPORATION  
**TERRADON**

PO Box 519, Nitro, WV 25143

304.755.8291

[www.terraddon.com](http://www.terraddon.com)

# **STONECOAL CREEK COMPLEX #2**

The Stonecoal Creek Complex project is located along Stonecoal Creek, near the community of Lillybrook, in southern Raleigh County. The site consists of eight coal refuse piles and twelve open mine portals. All the refuse piles have areas of steep, unstable slopes; they are the primary source of a very high sediment load to Stonecoal Creek. The subsequent sediment deposits in Stonecoal Creek have resulted in a significant reduction of the flow-carrying capacity of Stonecoal Creek, resulting in more frequent flooding of adjacent areas. The open mine portals are easily accessible and represent a significant life safety hazard from roof falls, potential deadly gases, and other hazards.

The purpose of this reclamation program is to regrade the refuse piles to stable slopes, provide proper stabilization with vegetative cover and permanent drainage channel improvements, and seal open mine portals. Generally, the refuse piles will be regraded to stable slopes and permanent drainage patterns will be established, relocating portions of Stonecoal Creek where necessary. Where refuse piles toe into the creek, stream bank protection will be provided. The open mine portals will be closed, wet seals will be placed in the 12 portals consisting of two drainage pipes. Two of the wet seals will receive cisterns since local residents are using the mine water. In addition, one of the portals to receive the cistern is to have a bat gate installed. Two of the remaining 10 wet mine seals are to receive bat gates. Bat gates consist of either 24 or 36-inch diameter plastic pipe with an angle iron grill. The wet mine seals are to be stowed with stone and covered with soil.

All disturbed areas will be revegetated or otherwise stabilized with structural methods. The access roads to gas wells will be maintained and returned to a good or better condition as they were found. Existing utilities will be relocated, where necessary.

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# STONECOAL CREEK COMPLEX

## #3

The Stonecoal Creek Complex project is located along Stonecoal Creek, near the community of Lillybrook, in southern Raleigh County. The site consists of five coal refuse piles, scattered gob, and six open mine portals. The open mine portals are easily accessible and represent a significant life safety hazard from roof falls, potential deadly gases, and other hazards.

The purpose of this reclamation program is to regrade the refuse piles to stable slopes, provide proper stabilization with vegetative cover and permanent drainage channel improvements, and seal open mine portals. Wet seals were needed in 5 of the portals consisting of two drainage pipes. Discharge from the mine is to drain into the existing drainage in front of the portal or channeled to the stream. Four of the wet mine seals received bat gates. Bat gates consist of either 24 or 36-inch diameter plastic pipe with an angle iron grill. There was only one dry mine seal needed on this project. The wet and dry mine seals are to be stowed with stone and covered with soil.

All disturbed areas will be revegetated or otherwise stabilized with structural methods. The access roads to gas wells were maintained and returned to as good or better condition as they were found. Existing utilities were relocated, where necessary. Two piles were to receive permanent access roads. A resident lives at the end of one of the permanent access roads, which must remain open.

Several foundations and piers, and railroad trestle abutments will be removed.

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# Jenkin Jones Refuse

The Jenkin Jones project is located near Anawalt, in southern McDowell County. The site consists of four large coal refuse piles which occupy approximately 75 acres of land area. All the refuse piles have areas of steep, unstable slopes that could slide creating a substantial hazard. In addition, two large buildings are to be demolished.

The purpose of this reclamation program is to regrade the refuse piles to stable slopes, and provide proper vegetative cover to minimize erosion. Permanent drainage channels will be provided to conduct the surface water off of, and around the refuse piles. Generally, the refuse piles will be regraded by excavating back the top portion to original ground while filling the bottom portion to form stable slopes. This will require keying the toe into the steep hillside.

The structures consist of a mine office building and company store with a small warehouse. The structures were built in 1917 by the Pocahontas Fuel Company. The buildings are substantial being constructed of brick, steel, and concrete. It is likely that some asbestos was used in the construction and asbestos sampling is to be conducted.

CORPORATION  
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PO Box 519, Nitro, WV 25143

304.755.8291

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# MICAJAH REFUSE PILE

The Micajah Refuse Pile project is located in Wyoming County, near Covell, West Virginia. The area was deep mined resulting in two refuse dumps and an open portal. An access road crosses both refuse piles. One access road embankments has a 12-foot diameter culvert. The site was mined by United Pocahontas Coal Company and was last mined in the 1960's. The site is south of Herndon on WV Route 16/2, off of WV Route 10. A frequently used gas well access road crosses the refuse piles.

The refuse piles have steep, unstable side slopes that span the valley and toe out in the creek. During heavy precipitation, refuse erodes from the side slopes and enters the stream. The refuse piles could impound water. Failure of the impoundments could endanger a railroad and public road. One of the piles is burning, creating noxious fumes and possible voids that present a cave-in hazard. Also an open portal exists that is draining.

The refuse piles were regraded to a stable configuration and stream drainage was channelized across the refuse. Scattered gob was incorporated into the regraded areas. The access road across the refuse piles was rerouted to a better condition than it was found. Existing gas lines were also relocated. The burning refuse was extinguished. The existing 12-foot steel plate pipe was removed and disposed of. The refuse on the valley floor of this site was "mucked" and backfilled with select rock fill over geotextile to provide a stable foundation for the regraded refuse. The existing portal was closed with a wet seal consisting of a double-block wall and two drainage pipes.

# **CARSWELL HOLLOW REFUSE PROJECT**

The site is located on Carswell Hollow Road, near Kimball, in northeastern McDowell County. The area drains to Laurel Branch, a tributary of Elkhorn Creek, which flows to Tug Fork. The entire project area had been extensively mined over several decades. The project area contained a large, steep, unstable coal refuse pile as well as an area consisting of structures, foundations, retaining walls, deep shafts and a tall smoke stack, from an abandoned mining operation.

The refuse pile was very steep and highly eroded along Laurel Branch. The refuse extended into the creek and was contributing significant sediment loads to the stream. The top of the embankment continues to slough off. The steepness of the eroding slopes represented a significant life safety hazard. The dilapidated buildings, retaining walls and smoke stack created a significant life safety hazard as well. The roof structures were collapsing, walls were in ruin and retaining walls had no fall protection.

The refuse pile was re-graded to establish a stable slope and stream bank protection was installed to eliminate erosion. All disturbed areas were re-vegetated. The dilapidated structures were demolished and properly disposed. The area was re-graded as well to provide proper drainage and vegetative cover.

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# **CEDAR CREEK REFUSE**

The Cedar Creek Refuse Pile project is located near the former town of Mahan, in Fayette County, West Virginia. The project area has been deep mined in three coal seams, No. 2 Gas, Powellton (Eagle "A"), and Eagle, each with open or draining portals. A large refuse pile is located near a portal in the Eagle seam. The site was mined by the Christian Colliery Company and the Carbon Fuel Company. The last mining was by the Carbon Fuel Company in the No. 2 Gas seam in the 1970s. The site is about one half mile south of the Mahan exit of the West Virginia Turnpike on County Route 15. A frequently used gas well access road leads to the refuse pile.

The refuse pile has steep, unstable side slopes which toe out in the creek below. The refuse covers the creek in several locations, creating the potential for impounding water and causing significant amounts of refuse to wash downstream. Additionally, during heavy precipitation, refuse erodes from the side slopes.

The site has multiple portals in all three coal seams, many are draining. The mine drainage from these portals is a contributor to poor water quality on the lower Paint Creek watershed. The roof of the portals which remain open are severely weathered and the rock strata is cracked. The partial remains of a brick structure exist at one of the portals.

The refuse pile will be excavated and regraded to a stable configuration. The regrade will require a valley fill with underdrains and surface water control structures. Exposed refuse will receive soil cover. The structures shall be dismantled and removed. The draining portals will have wet seals installed after the mine workings are dewatered. The discharge shall be treated and diverted to the stream. Debris and scrap metal will be disposed of properly. All disturbed areas will be revegetated.

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# **SPRING BRANCH BURNING REFUSE**

The Spring Branch Burning Refuse Pile project is located around the former town of Milburn, in Fayette County, West Virginia. The project has three separate sites, each with coal refuse piles. Site one is just below Milburn on Paint Creek, it is a small refuse pile between County Road 15 and Paint Creek. Site two is across Paint Creek from Milburn and about a half-mile up Spring Branch. It has a large refuse disposal area covering about 4 acres and two other refuse areas about two acres each. Site three is about one half-mile above Milburn on Paint Creek, it is a small refuse pile between Interstate 64/77 and the CSX railroad right-of-way.

Refuse Pile No. 1 will be regraded to stabilize the slope, covered with soil and revegetated, and shall have drainage structures installed to prevent erosion.

Refuse Pile No. 2A will be excavated, burning refuse extinguished and regraded to a stable configuration. The regrade requires a valley fill with underdrains and surface water control structures. The upper area of the pile will be removed to original ground due to the steep slopes, thereby requiring the relocation of the gas company access road that crosses the pile. Exposed refuse will receive soil cover. All disturbed areas will be revegetated.

Refuse Pile No. 2B will be removed to original ground. The refuse will be hauled to Pile No. 2A and incorporated in the valley fill. Surface water diversion will be installed and all disturbed areas will be revegetated.

Refuse Pile No. 2C will be handled in the same manner as Refuse Pile No. 2B.

Refuse Pile No. 3 will be regraded to stabilize the steep slopes, covered with soil and revegetated, and shall have drainage structures installed to prevent erosion.

Areas on any of the three sites that have trees or shrubs established will be direct seeded or soil covered in such a way that does not harm the existing vegetation.



# GRASS RUN REFUSE

The Grass Run Refuse project is located approximately one mile north of the intersection of Routes 33/3 and 119/19 (Grass Run Road) in Lewis County, West Virginia. The project site is approximately five miles east of Weston. The Grass Run Refuse project includes a series of water treatment ponds, coarse coal refuse disposal areas, fine coal refuse slurry ponds, foundations associated with a preparation plant, unreclaimed highwalls, and backfilled mine entries. Acid mine drainage (AMD), high suspended solids, and excessive runoff contribute to poor water quality and flooding along Grass Run, a tributary of Stonecoal Creek.

Coarse coal refuse was disposed at numerous locations over the site. The main disposal area was a valley fill constructed in the north fork of the site. The fill covers approximately 11 acres and contains coal refuse to a depth of over 60 feet. Other coarse coal refuse disposal areas exist in the east fork of the site.

Fine coal refuse was disposed in several slurry ponds. Based on visual observations, disposal of fine coal refuse is evident along the west side of the north fork and in two ponds near the confluence of the north and east forks. The surface area of these ponds is approximately 5 acres.

Several water treatment ponds exist at the site for sediment control and AMD treatment. Some of these ponds contain water and sediments while others have been breached.

The reclamation of the site shall include regrading areas of coal refuse to provide positive drainage. Areas of coarse coal refuse located in the east fork shall be regraded. Two breached ponds shall be covered and developed into wetland areas. Two ponds shall be rehabilitated to provide stormwater detention to lessen downstream flooding. One pond shall be covered and vegetated. Dangerous highwalls shall be eliminated. Surface water channels shall be constructed to convey runoff through the site. Finally, exposed coal refuse shall be covered with a 1 foot layer of soil and revegetated.

The approximate area contained within the limits of construction is 120 acres. The Spring Branch Burning Refuse Pile project is located around the former town of Milburn, in Fayette County, West Virginia. The project has three separate sites, each with coal refuse piles. Site one is just below Milburn on Paint Creek, it is a small refuse pile between County Road 15 and Paint Creek. Site two is across Paint Creek from Milburn and about a half-mile up Spring Branch. It has a large refuse disposal area covering about 4 acres and two other refuse areas about two acres each. Site three is about one half-mile above Milburn on Paint Creek, it is a small refuse pile between Interstate 64/77 and the CSX railroad right-of-way.

Refuse Pile No. 1 will be regraded to stabilize the slope, covered with soil and revegetated, and shall have drainage structures installed to prevent erosion.

Refuse Pile No. 2A will be excavated, burning refuse extinguished and regraded to a stable configuration. The regrade requires a valley fill with underdrains

# **GRASS RUN REFUSE (cont.)**

and surface water control structures. The upper area of the pile will be removed to original ground due to the steep slopes, thereby requiring the relocation of the gas company access road that crosses the pile. Exposed refuse will receive soil cover. All disturbed areas will be revegetated.

Refuse Pile No. 2B will be removed to original ground. The refuse will be hauled to Pile No. 2A and incorporated in the valley fill. Surface water diversion will be installed and all disturbed areas will be revegetated.

Refuse Pile No. 2C will be handled in the same manner as Refuse Pile No. 2B.

Refuse Pile No. 3 will be regraded to stabilize the steep slopes, covered with soil and revegetated, and shall have drainage structures installed to prevent erosion.

Areas on any of the three sites that have trees or shrubs established will be direct seeded or soil covered in such a way that does not harm the existing vegetation.

# **BLACK WOLFE REFUSE**

The Black Wolfe Refuse project is located approximately one mile northwest of the intersection of State Routes 103 and 161 in McDowell County, West Virginia. The project site is approximately three miles southeast of Gary. The site consists of a 12 acre refuse pile and one smaller pile, five (5) portals, an abandoned tipple and mining equipment. The refuse pile is unstable, as evidenced by slips and erosion, and has already begun to block the stream at the toe of the pile. Three (3) of the portals have large openings with hazardous roof conditions.

Near the center of the project site, there are the remains of a preparation plant and loadout facility. This area has debris that is potentially hazardous, including old scrap metal. There are also deteriorating retaining walls, small refuse piles and abandoned rail lines. Additionally, old building remains are scattered around the old preparation area.

Coal refuse has been primarily disposed in two piles. They are approximately 1500 feet upstream of the confluence of the Tug Fork and Doc Branch. The large pile is as much as 50 feet deep and both have several eroded areas which are impacting Doc Branch. There is a small illegal dump next to the large pile.

The purpose of this reclamation program is to regrade and cover the exposed coal refuse at the site, properly seal the mine portals, and remove the building remains. Drainage channels shall be constructed to minimize uncontrolled runoff and erosion. Garbage at the site shall be disposed of properly. All areas with sparse or no vegetation shall be vegetated.

The approximate area contained within the limits of construction is 28 acres. The Camp Mahonegan Surface Mine project is located along the border of Randolph and Barbour Counties, West Virginia. The problem area includes acid mine drainage (AMD) seeps from numerous locations over an area of approximately 100 acres. AMD is believed to be a result of surface mining the Kittanning coal seam by mountaintop mining methods during the 1960s and early 1970s. During mining, the Homewood sandstone overburden was brought to the surface as spoil. This acidic overburden is responsible for sparse vegetation over portions of the site.

TERRADON identified over 20 locations where AMD seeps impact surface water. The reclamation plan includes constructing both anoxic limestone drains (ALD) and open limestone channels (OLC) to generate alkalinity to buffer the AMD. Two existing ponds will have the existing pipe outlets removed, the embankments lowered and new spillways installed. Areas that have standing water will be regraded to provide positive drainage. Areas that lack soil cover and vegetation will be covered with soil from borrow areas. All disturbed areas will be limed, fertilized, seeded and mulched.

# **LOWER BURNING CREEK REFUSE**

The Lower Burning Creek Refuse project is located at the intersection of U.S. Routes 52 and 52/12 in Mingo County, West Virginia. The project site is approximately one-half mile southeast of the town of Kermit. The site consists of two ponds, coarse coal refuse disposal areas, foundations of preparation plant and loadout facility, open mine entries, and an unreclaimed highwall.

Two ponds were identified at the site. The ponds are adjacent to each other and next to Lower Burning Creek at the entrance to the site. The ponds appear to have been sediment control structures and/or water treatment structures. Both ponds have failing outlet pipes and the potential to cause downstream flooding. The embankments of both ponds appear to be constructed of refuse material. One pond has a seep at its toe that is orange from iron precipitate. Uncontaminated surface water is probably infiltrating through the refuse material causing acid mine drainage (AMD).

Just upstream from the ponds are the remains of a preparation plant and loadout facility. This area has debris that is potentially hazardous, including old capacitors and scrap metal. There are also deteriorating retaining walls, small refuse piles and abandoned rail lines. Additionally, several old building remains are scattered across the project area.

Coarse coal refuse has been primarily disposed in two piles next to Lower Burning Creek. The first is approximately 500 feet upstream of the loadout facility. It is 1.5 acres and as much as 25 feet deep. The pile is restricting the creek as it erodes and slides into the channel.

The second refuse pile is approximately 500 feet upstream from the first. It is 3.5 acres in area and has very little vegetation. The pile is as much as 50 feet deep and has several eroded areas. There is a small illegal dump next to this pile.

The purpose of this reclamation program is to regrade and cover the exposed coal refuse at the site, and seal the open mine portals. Areas of standing water in contact with acidic coal refuse shall be eliminated. Drainage channels shall be constructed to minimize contact between runoff and the refuse. The settling ponds (presently inoperative) shall be removed. Garbage at the site shall be disposed of properly. All areas with sparse or no vegetation shall be vegetated.

The approximate area contained within the limits of construction is 50 acres.

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# **TUPPERS CREEK (LAYNE) LANDSLIDE**

The Tappers Creek (Layne) Landslide project is located two miles southeast of the Tappers Creek exit of Interstate 77 near Charleston, in Kanawha County, West Virginia. The site is accessed by turning right (if coming from Charleston) from the exit ramp onto County Route 26/1. Proceed for approximately 7/10 mile to County Route 26/9 and turn right, the intersection is in a sharp curve to the left. Proceed approximately 7/10 mile to an intersection with an unmarked gravel road in a cluster of houses. Turn right onto the gravel road and proceed toward the head of the hollow. The gravel road splits about 500' from County Route 26/9. The right hand fork follows the creek and leads to the Layne residence (bottom of the landslide). The left hand fork immediately narrows and climbs sharply toward the two Haynes residences. The project area has numerous houses built on and below the Pittsburgh coal seam. Numerous collapsed portals discharge acid mine drainage B killing vegetation and causing landslides. One section of the workings is known to be completely flooded with other sections suspected to be at least partially flooded. The proximity of residences down stream of the flooded mine workings requires that any pooled water be eliminated.

The remedial measures for this project include:

1. Establishing positive drainage around the landslide at the Layne residence.
2. Removal of the landslide material to a waste area.
3. Installing wet mine seals and dewatering the mine workings.
4. Providing positive drainage from the wet mine seals to natural drainage features.
5. Revegetating all disturbed areas.
6. Resurfacing the existing roads in the project area after construction is completed.

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# **GERATH LANDSLIDE**

The Gerath Landslide project is located adjacent to the Weston/Buckhannon exit of Interstate 79 near Weston, in Lewis County, West Virginia. The site is accessed by turning left (if coming from Charleston) from the exit ramp onto U.S. Route 33. Proceed for approximately 2/10 mile to County Route 119/16 (Mud Lick Road) and turn left. Proceed approximately 7/10 mile to an intersection with an unmarked dirt road. Turn right onto the dirt road and proceed 3/10 mile to the project site. The project area consists of three landslides, one above the access road to RPM Salvage and two below. The two slides below the road are blocking the stream below and threatening the stability of the access road. The slide above the road will not be addressed in this project.

The remedial measures for this project include:

1. Establishing positive drainage around the landslide.
2. Removal of the landslide material to a waste area.
3. Installing underdrains and riprap buttresses.
4. Revegetating all disturbed areas.
5. Resurfacing the existing road in the project area after construction is completed.

# **BRUSHY FORK WATER FEASIBILITY STUDY**

The Pittsburgh and Redstone coal seams have been extensively surface and deep mined throughout the study area. There has been an observed and measured adverse effect on the quality and quantity of groundwater within the study area that is consistent with expected effects from pre-law coal mining.

The groundwater flow regime can typically be summarized as follows; surface water infiltrates the ground surface and permeates vertically downward through soil and rock until a relatively impermeable layer is encountered or a saturated zone is encountered. If relatively impermeable strata is encountered, water will migrate along the interface in the direction of the dip until the strata outcrops (resulting in a spring or seep) or until a vertical fracture is encountered. Similarly, the water will travel along the fracture until another fracture is encountered or the fracture terminates. Because the area has been mined so extensively, it is likely that the upper fractures will terminate at abandoned deep mines while below the strip mines the fractures penetrate into deeper strata. All of the wells and springs are below the mined seams. Within this potable horizon, the fragile perched water tables become fractured from blasting, drain, thus reducing well yields. Water flowing from mines is highly contaminated, it infiltrates, and contributes to the problems in the potable horizon. Additionally, water that percolates through pastures infiltrates the fractured horizon and creates biological contamination.

The resident interviews indicated 23% of the wells have inadequate yields. Most of the study area appears to be affected by pre-law mining except Birds Run (see Figure 1). The analytical results indicated 56% of potable water is chemically or biologically affected for the entire study area and 60% when excluding the Birds Run area. Comparing the pre-law mining to post-law mining, TERRADON estimates that approximately 90% of the area is affected by pre-law mining. To combine these foregoing percentages, we estimate the overall impact as follows:

For the Entire Study Area:  $(56+23) \times 0.904 = 71.1 \%$   
Excluding Birds Run Area:  $(60+23) \times 0.904 = 75.0 \%$

The benefits from a public water distribution system within the study area would be numerous. Based on the cost estimate presented at the end of this report, the extension of public water service into the entire study area would cost \$1,246,000, while excluding Birds Run the cost is \$1,085,000. These figures on a cost per customer basis are \$14,159 and \$13,562, respectively. Using the above percentages, the Century Volga PSD cost per customer would be as follows:

For the Entire Study Area:  $(1-0.711) \times \$14,159 = \$4,092/\text{Customer}$   
Excluding Birds Run Area:  $(1-0.750) \times \$13,562 = \$3,391/\text{Customer}$

We recommended extending the water line into the study area excluding the Birds Run area. This alternative provides the most dependable and cost-effective solution to the existing water quality and quantity problems within the study area.

# Highland Avenue Mine Drainage

The Highland Avenue Drainage Project consists of replacement of existing mine seals, the addition of an underdrain system, and the replacement of corroded underground sanitary sewer systems. The drainage system installed intercepts and drains subsurface waters from abandoned mine shafts which lie above Nuttal, Clifton, and Highland Avenues in the City of Wheeling, Ohio County, West Virginia.

The problem created a nuisances and property damage from the mineral-laden subsurface seepage onto the residential properties and public streets. This problem was caused by roof falls and clogged mine drains. Existing mine seals were removed and replaced with new seals and drainage system. A special underdrain system was installed continuously on three parcels to intercept subsurface seepage and prevent further damage to foundation walls and basements. The existing corroded sanitary sewer systems downstream of the problem were replaced to properly transport the intercepted drainage and sewer flows.

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# **NORTH VIEW MINE DRAINAGE**

The North View Mine Drainage project is located in the North View section of Clarksburg, West Virginia. The proposed mine drainage project consists of interceptor and piping systems, wet mine seals, and a special basement treatment for mine water. Mine water was intercepted just below the coal seam elevation along Richards Avenue on both sides of its intersection with North 18<sup>th</sup> Street. The intercepted mine water was conveyed through 12 PVC pipe to the existing catch basins at the corners of the intersection. Similarly, water from sealed mine portals about ½ mile away from the above mentioned site was conveyed to the existing storm sewer system.

The wet mine seals were installed after excavating and dewatering the mine portal. During dewatering of the existing mine, the discharge was monitored and treated, as necessary, to meet state and federal discharge limits. The wet seal consists of drainage stone, 12 inch PVC perforated pipe, and a compacted soil cover.

A special basement treatment is required to intercept seepage at the perimeter and beneath the floor of a garage. The treatment included removing the existing floor and installing both a perimeter drain, and a drainage blanket in the floor area. A new concrete floor was install over the area drain. These drains collect AMD into a pipe which discharges into the sewer at the end of the driveway. This project solved wet conditions in basements, on roads, and in yards.

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