

0068

QUALIFICATION STATEMENT
AND COST PROPOSAL FOR

TECHNICAL ASSISTANCE IN PERMIT REVIEW RELATED
TO COAL MINING AND RECLAMATION
PERMANENT PROGRAM:
ACR, DOC AND TA FOR WEST APPA COAL COMPANY
RILDA CANYON MINE

Req. No. 580322

Submitted to

State of Utah
Natural Resources and Energy
4241 State Office Building
Salt Lake City, Utah 84114

by

Simons, Li & Associates, Inc.
P.O. Box 1816
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FILE IN Expandable

Refer to Record No. 0008
in 1015/025, 1983, Incoming
for additional information

I. EXPERIENCE OF SIMONS, LI & ASSOCIATES, INC.

1.1 General Mining Related Experience

Simons, Li & Associates, Inc. (SLA) is a multidisciplinary small business firm with specific expertise in surface-water hydrology, hydraulics, water resources, mine-land reclamation, channel stabilization and restoration and has worked with various coal mining concerns as well as with the Federal Office of Surface Mining (OSM) on several contracts. SLA has worked on the following manuals for the OSM office in Denver: "Prediction of Soil Erodibility Factor 'K' on Reclaimed Mine Soils" and "Surface Water Hydrology and Sedimentology Manual," and for the Washington, D.C. office of OSM. In addition SLA has engaged in a Study of Sediment Control Structures for Small Areas in Surface Coal Mining, Development of Design Manual for Water Diversions on Surface Mining Operations, Development of Design Manual for Sediment Control through Sediment Ponds and Other Physical/Chemical Treatments. With the experience in preparing several OSM design manuals and with experience with mining companies, SLA has gained considerable knowledge of the OSM regulations and their application in the controlling of surface mining.

SLA is also a participant in a national level open-ended mine permit review contract with OSM. This contract required participating firms to demonstrate a comprehensive knowledge of the permit process, the mining industry and the environmental physical processes that are active in mining areas. This project requires the same three steps described in the Statement of Work for the present requisition, that is, Apparent Completeness Review, Determination of Completeness and Findings and Supporting Documentation.

SLA is currently reviewing the mining reclamation plans of five underground mines in Utah and three surface mines in Washington. These reviews have included a detailed analysis of the local geology, groundwater hydrology, surface-water hydrology, air quality, cultural resources, mining engineering, soils and overburden, fish and wildlife habitat, and vegetation. In addition, two cumulative hydrologic impact assessments (CHIAs) are being conducted for two watersheds in east-central Utah. The CHIAs assess the impact of the existing and proposed mining operations on the regional and local hydrologic regime.

Energy and mining related activities at Simons, Li & Associates, Inc. (SLA) are a natural outgrowth of the company's early emphasis. In general, SLA provides engineering and environmental consulting, as well as other technical services to assist clients in all aspects of hydrology, hydraulics, contaminant transport and water resources development. In all of these areas, SLA has pioneered the development and application of advanced computer analysis to runoff problems. In addition, we are familiar with all traditional approaches to these problems. Specific approaches used are tailored to the needs of the client. Through participation in development and application of these methods to engineering problems, the staff at SLA has achieved a unique understanding of the physical processes acting in the environment. This understanding provides an ability to recognize the limitations and benefits of simpler, more traditional approaches, and the ability to apply more refined techniques when necessary. Therefore, SLA offers clients an exceptionally well-trained staff under the direction of principals who are nationally and internationally recognized as leaders in the field.

The principals of SLA have for several decades been involved in a wide spectrum of consulting and research projects in the areas of watershed sediment yield analysis; hydrology, hydraulic, erosion, sedimentation, hydraulic structures, and flood control analyses; canal design; ground water investigations; navigation, transportation, and environmental impact analysis; hydrologic and hydraulic modeling; and expert witness activities. As described above, through several projects conducted for mining companies and the Office of Surface Mining, SLA has applied this expertise to mining problems and developed a staff that understands mining practices and regulations. The firm is qualified to perform all types of analysis required for mine plan permit applications. Such analyses include:

Mine Land Runoff

Such analysis includes:

- determination of hydrologic consequences
- water quality and quantity monitoring
- design of hydraulic structures
- sediment pond design
- drainage diversions
- erosion control measures

Environmental Impacts

SLA also provides expertise in the areas necessary for describing and analyzing impacts on:

- land use
- cultural and historic resources
- geology
- climatology
- soils
- fish and wildlife
- economics
- prime farmland

Assessment of Hydrologic Impacts

The staff of SLA has performed hydrologic impact assessments in several past and ongoing studies. These studies have evaluated the potential impacts of mining operations on the local groundwater and surface water regime. The impacts can be associated with the hydrologic consequences of mine land runoff, potential effects of mining on the recharge and discharge of local water-bearing units, effects of dewatering, changes in potentiometric surface as a result of mining, effect of mining on existing water users and an evaluation of pre- and post-mining water quality. In many of the assessments, field data were collected to include stream gaging data and sediment samples, overburden samples, measurements taken to determine seepage losses, water level measurements from monitoring wells, and water samples from surface water and groundwater sources for analyzing their water quality.

Reclamation Plans

In addition, SLA has the multidisciplinary staff in range science and soil science necessary to prepare effective reclamation plans. Acceptable reclamation certainly requires a knowledge of native vegetation and seed mixes. Further, the revegetation effort is usually most productive when coordinated with long-term erosion control measures. SLA staff have the experience and analytical tools to provide this integrated approach.

Navajo Mine Plan Analysis

An example of the firm's experience in the private sector is the hydrologic analysis and hydraulic structure design for Utah International's Navajo Mine in northwestern New Mexico. SLA performed the hydrologic and hydraulic analysis and ultimately the design of diversions and sediment control measures. This was a large task due to the size of the mining operation and the nearly 200 square miles of upstream watersheds intersected by mining activities.

Alluvial Valley Floors

Daryl B. Simons and Ruh-Ming Li are among the world's authorities in the response of alluvial channels to any form of disturbance. Past clients in this area have included general concerns as well as coal and uranium mining firms. The response of alluvial channels and the associated valley floor is a complex interaction of geomorphologic, hydraulic and sediment transport processes. SLA offers a staff with decades of experience working with alluvial channels throughout North America. Therefore, the firm is uniquely qualified to analyze impacts of mining in alluvial valleys and design mitigation measures.

Erosion from Haul Roads

SLA has developed several advanced methodologies for the prediction and control of erosion from haul roads. These techniques allow rapid estimation of the impacts of roads on the mine land environment. Sediment from roads is often one of the most important sources of sediment in disturbed lands. Proper design of alignment, cut and fill slopes and drainage can minimize the impact of roads from the overall mine related activities. SLA's approach to this problem is not only state-of-the-art, but the most cost effective way of estimating the extent of this impact.

Other specific areas of service offered by SLA and also relevant to mining activities industry are listed below.

Hydrologic Analysis

Surface water hydrology

Ground water hydrology

Probabilistic, statistical and stochastic analysis

Computer modeling

Flood and drought studies
Water quality analysis
Evaluation of hydrologic monitoring systems

Field Data Collection and Monitoring

Design and implementation of hydrologic monitoring systems
Pump tests
Surface and ground water quality
Sediment sampling
Stream gaging
Channel cross section and profile surveying

Hydraulic and Structural Design

Water diversion and hydraulic structures related to mining, post-mining and restoration activities
Sediment ponds
Detention ponds
Drop structures and energy dissipators
Roadway drainage
River and stream bank protection
Waste disposal
Slurry pipeline
Tailings ponds
Erosion protection designs

On-Site Rainfall Simulation Studies

Evaluating water and sediment runoff
Water quality of surface runoff
Infiltration rates
Evaluating effectiveness of erosion control practices
Baseline data for compliance with Federal regulations

Laboratory Analyses of Sediment Samples

Size by wet and dry sieving
Size by hydrometer analysis
Size by pipette analysis

Porosity
Density
Atterberg limits
Moisture content

Design for Erosion and Seepage Control Projects

Ditch and reservoir linings
Jute matting
Filter cloth
Fiberglass matting
Vegetative linings
Alternative sediment control methods for sediment control from
small areas
Channel protection

Litigation Support

Expert witness services
Testimonial documents

Construction Management

Dam Safety Inspections

Cost Estimation

A matrix of projects completed by SLA and their team of special consultants which contain the technical expertise required by the Utah Division of Oil, Gas, and Mining and the Office of Surface Mining is provided on the following pages.

1.2 Specific Project Descriptions

The following selected projects illustrate SLA's experience pertinent to surface and underground mining activities.

Best Management Practice for Control of Sediment in Effluent from the Navajo Mine

This project consisted of a position paper supporting the best management practice for sediment control at the Navajo Mine (a surface coal mine near Farmington, New Mexico). The paper demonstrated that the natural level of sediment in the runoff from the area was much greater than that allowed by surface mining regulations. Demonstration was based on measured runoff events and simulations using a physical process model.

The best management practice adopted was to allow no increase in sediment concentrations in the effluent from the mine over the incoming concentrations. This practice will ensure better maintenance of the "prevailing hydrologic balance" than meeting the numerical effluent levels in OSM and New Mexico regulations.

Completion Date: 1981

Reference: Ed Pettigrew
Utah International, Inc.
P. O. Box 155
Fruitland, New Mexico 87416

Determination of Probable Maximum Flood from the Pipeline Canyon Watershed,
New Mexico

Simons, Li & Associates, Inc. conducted a hydrologic study to determine the probable maximum flood (PMF) through the Pipeline Canyon Watershed for the purpose of determining the stability of a uranium tailings disposal dam. The PMF was computed through use of a multiple watershed water and sediment routing model developed by the staff of Simons, Li & Associates, Inc. Due to the distinct changes in slope from subbasin to subbasin, simplified procedures such as the hydrograph obtained by the Soil Conservation Service were unacceptable. The method used was based on the governing physical processes relating to water routing. The PMF hydrograph was used in a subsequent study involving the adequacy of the United Nuclear Corporation Church Rock, New Mexico disposal site.

Completion date: 1980

Reference: Don Silva
Science Applications, Inc.
501 Marquette, N.W.
Suite 1100
Albuquerque, NM 87102

Develop Small-Plot Rainfall Simulation Devices to Study Effects of Livestock Grazing on Infiltration Rates, Runoff, Sediment Yields and Salinity of Surface Runoff From Mancos Shale-Derived Soil

Livestock grazing can have a significant effect on the hydrologic characteristics of rangeland. The processes affected include infiltration, runoff, sediment production and salt content of the surface runoff. Salinity is a major pollutant and a serious problem in the western United States and also in many countries of the world. The magnitude of the impact from grazing on the hydrologic processes of rangeland depends on the management practices followed. Overgrazing can weaken the grasslands and create a condition of extreme sensitivity to prolonged periods of deficient soil moisture. The loss of vegetation promotes increased runoff and soil loss and modifies the long-term balance or equilibrium of hydrologic processes that the rangeland has established. Minimizing the adverse effects of grazing, particularly those related to salinity, requires developing a management plan. Unfortunately, limited data are available on the effects of livestock grazing on salt concentrations in surface runoff. Therefore, the Bureau of Land Management awarded this contract to conduct a preliminary analysis of feasible livestock management treatments in order to determine those that have the greatest effect on surface runoff salinity. The specific objective of the study is to quantify and analyze the effects of trampling by livestock during simulated grazing on infiltration rates, runoff, sediment production and salt content of surface runoff from Mancos shale-derived soils using small-plot rainfall simulations to simulate summer thunderstorms. The project required design and construction of a drop former-type rainfall simulator, field data collection for two months using this device, and detailed statistical analysis of the data collected.

Completion date: 1981

Reference: Mr. Scott Fisher
Bureau of Land Management
Denver Federal Center
Denver, Colorado 80225

Development of a Design Manual for Water Diversions on Surface Mining Operations, Washington, D.C.

A manual was prepared which involved a thorough literature review and analysis of the state-of-the-art technology available for diversion design. Subjects that were discussed included:

1. Physical and geological considerations
2. Surface mining methods
3. Background information for diversion design
4. Hydrology
5. Open-channel flow
6. Movable boundary hydraulics
7. Stable channel design
8. Channel lining
9. Geotechnical and ecological considerations

The manual is applicable for diversions in OSM Regions 1 and 2.

After the literature review, a second manual was prepared which provides guidelines for designing diversions based on the best ecological, hydraulic, hydrologic, and geotechnical technology available for the practical use of designers on surface mining operations.

Completion date: 1981

Reference: Office of Surface Mining
Department of the Interior
Washington, D.C. 20204

Development of Hydrology Manual for Surface Mining, Washington, D.C.

This project involved writing a hydrology manual for the Office of Surface Mining which illustrates various hydrologic techniques for assessing surface runoff from mines. The procedures discussed began with the estimation of rainfall magnitudes corresponding to specified return periods and durations. Techniques for estimating runoff volume were discussed and in particular methods for estimating infiltration losses. The runoff volume is used in conjunction with watershed characteristics to estimate runoff hydrographs. Methods to determine peak discharges, time of concentration, and hydrograph shape are all discussed. The most common methods of calculating hydrographs were presented, such as the unit hydrograph and SCS triangular hydrograph approaches with nomographs and design examples. Finally, a discussion of appropriate methods for determination of runoff hydrographs from large, complex mineland watersheds was included. Several sophisticated hydrology techniques were emphasized.

Completion Date: 1981

Reference: John Nadolski
Department of the Interior
Office of Surface Mining
Denver, CO 80202

Effectiveness of Vegetation Buffer for Controlling Sediment and Other Water Pollutants from Disturbed Watersheds

In order to evaluate the effectiveness of various vegetated buffer strip designs, a mathematical simulation of buffer strip hydraulics was developed. This work was performed for the U.S. Environmental Protection Agency, Environmental Research Laboratory, Athens, Georgia. Hydraulics of overland flow were combined with sediment and nutrient transport to provide evaluation of trapping efficiency and detention time of pollutants as a function of design parameters. The model uses recent developments in estimating resistance to flow through vegetation. By examining scour and vegetation root depth, the stability of the buffer strip may also be examined. The model provides a valuable tool in assessing the design of streamside buffer strips.

Completion Date: 1980

Reference: Lee Mulkey
Environmental Protection Agency
Environmental Research Laboratory
Athens, Georgia 30601
(404) 546-3581

Environmental Assessment of Coal Mining in Northwest Georgia

The primary objective of this study is to define the regional environmental consequences of future coal mining operation in Dade, Walker, and Chattooga counties in northwest Georgia. The level of mining activity is dependent on the market value of coal and the cost of extracting and transporting coal. Very little coal mining is presently being done in Georgia and unless the economics of the value of coal versus the cost of mining and transporting coal changes positively in direction of coal mining, very little increase in mining activity is foreseen for Georgia.

For the purpose of this study, three alternative levels of coal mining were evaluated. The Low Option assumes no mining, the Medium Option assumes 2-4 small scale operations, and the High Option assumes 5-10 small scale operations and one relatively large operation. The environmental assessment evaluates the cumulative effects of mining for the alternative mining operations through 1990.

A summary of the environmental consequences for the three alternative scenarios is illustrated in an Environmental Impact Matrix. Probable adverse impacts of mining include disruption of agricultural, forest and hunting areas, increased noise levels and traffic. Potential adverse impacts include inadvertent loss of endangered species habitat, contamination or loss of groundwater supplies, uncovering and damage to archeological sites and financial burden to local governments for maintaining and upgrading impacted local infrastructure systems. Positive impacts are the additional income and jobs generated by the mining industry.

The extent of the impacts can be mitigated by implementing a responsible program wherein each mine operator is required to meet or exceed minimum environmental standards defined under OSM's program and wherein local governments are provided with the necessary funds to maintain and upgrade the coal-impacted infrastructure systems with coal-generated revenues.

Completion Date: 1981

Reference: J. F. Sato
J. F. Sato and Associates
Consulting Engineers
5898 South Rapp Street
Littleton, Colorado 80120

Evaluation of the Canyon del Marquez Diversion at the Bokum Resources Uranium Mill Site, New Mexico

SLA was requested by Stearns-Rogers, Inc. to evaluate the proposed design of the Canyon del Marquez Diversion of the Bokum Resources Uranium Mill site. The diversion was proposed in order to allow disposal of tailings in the area. Included in the study were the determination of the probable maximum precipitation, probable maximum flood, evaluation of the diversion design for the probable maximum flood, and recommendation of modifications to the diversion.

The determination of the probable maximum flood hydrograph was based on the MULTWAT physical process watershed runoff model. This allowed the breakdown of the watershed into many subwatershed units and provided an accurate and realistic representation of the topography of the watershed. This was particularly important in this case since the watershed was composed of a flat upstream area, a steep middle section and a flat downstream area. A double peaked hydrograph resulted from the topography which produced a smaller peak than would have been predicted by unit hydrograph techniques creating a single peak.

Evaluation of the diversion was based on discharge capacity considering the moveable bed hydraulics, erosion and sedimentation problems and channel stability. Recommendation for channel modifications were made.

Completion Date: 1979

Reference: Edmund J. Schneider
Stearns-Rogers, Inc.
4500 Cherry Creek South Drive
P.O. Box 5888
Denver, CO 80222
(303) 758-1122

General Hydrology and Probable Hydrologic Consequences for G.E.C. Minerals, Inc. Surface Coal Mine Near Florence, Colorado

As part of the permit application to the Office of Surface Mining, a description of the general hydrology and determination of probable hydrologic consequences is required. Simons, Li & Associates, Inc. was contracted by J. F. Sato and Associates to provide the necessary information for these portions of the permit application. Funding was through the Small Operations Assistance Program provided by the Office of Surface Mining.

The general hydrology for the area was developed incorporating snowmelt based on Simulation of Subalpine Watersheds (Lief and Brink 1973). All structures used on the mine site were evaluated based on state and federal regulations including sediment pond storage capacities, spillway requirements, diversion channel stability, and stream channel reclamation. The analysis was done using a water and sediment hydrograph model developed by Simons, Li & Associates, Inc. The model incorporates many parameters such as ground and canopy cover, hydraulic conductivity, overland flow resistance, and sediment size distribution. By adjustment of the parameters for the area disturbed by mining operations, the hydrologic consequences can be accurately determined.

Completion Date: 1981

Reference: Ms. Ginger K. Sunday
J. F. Sato and Associates
Consulting Engineers
5898 South Rapp Street
Littleton, Colorado 80120
(303) 797-1200

Guideline for Design of Channels and Hydraulic Structures on Erodible
(Sandy) Soils

Major drainageway structures built on sandy soils are commonly found in Toll Gate Creek, Sand Creek, and Cherry Creek in the Urban Drainage and Flood Control District, Denver, Colorado. For an orderly maintenance program, and recognizing the history of problems and costly failures of channel and hydraulic structures on sandy soils, the District and the City of Aurora, Colorado, decided to establish criteria to assist with final design and design review of drainageway facilities on sandy soils.

The criteria presents accurate and efficient methods for evaluating alluvial channels and provides equations and graphs for designing major drainageway facilities. Because of the complex nature of the response to channel development, applying a design standard without understanding the characteristics of sand-bed channels may lead to improper design of major drainageway facilities. Therefore, the criteria also includes general descriptions of characteristics of sand-bed channels, design considerations for major drainageway facilities located on sandy soils, and a design standard which provides design engineers with minimum design procedures to follow and typical details for the design of major drainageway facilities.

Completion Date: 1981

Reference: Mr. Ben Urbonas
Chief, Master Planning Program
Urban Drainage and Flood Control District
2480 West 26th Avenue
Denver, CO 80211
(303) 455-6277

Mr. Charlie Carroll
Director of Utilities
City of Aurora
1470 South Havana Street
Aurora, CO 80012
(303) 695-7382

Investigation of the Stability of the Uranium Tailings Disposal Site at
United Nuclear Corporation's Churchrock Mill Considering Probable
Maximum Flood

Simons, Li & Associates, Inc. (SLA) was asked to perform this study by Science Applications, Inc. SLA had previously determined the Probable Maximum Flood (PMF) hydrograph. The major problems were that the tailings disposal site was located within the floodplain created by the PMF and because it is located in the valley floor, there were concerns over lateral migration of the channel.

The U.S. Army Corps of Engineers HEC-2 backwater curve computation program was employed to determine flood elevations and velocities. Stability of the site was evaluated considering a three-level erosion and sedimentation analysis. The third level of analysis used a sediment routing model developed by SLA to determine the aggradation/degradation problem during the PMF. The stability analysis showed the site to be unstable during the PMF or for a long-term basis. Engineering solutions were concluded to be extremely costly.

A later study which considered the site as temporary was conducted. Protection measures for the temporary designation of the site were made utilizing risk analysis to justify a flood smaller than the PMF.

Completion Date: 1980

Reference: Don Silva
Science Applications, Inc.
501 Marquette, N.W.
Suite 1100
Albuquerque, NM 87102

Prediction of the Soil Erodibility Factor K on Reclaimed Mine Soils

The Universal Soil Loss Equation (USLE) is used for estimating soil loss on western mine sites. However, a significant question raised by this usage is whether or not the soil erodibility factor K of the USLE has the same value for soils on unmined and reclaimed lands. At the request of the Office of Surface Mining, SLA evaluated K factors for post-mining soils and compared it to the value for pre-mined soils.

The approach to evaluate the soil erodibility factor K for pre- and post-mined soils was on-site field evaluation which employed simulated rainfall to determine the average soil loss per unit of rainfall energy. The Phase I testing involved four soil types in both pre- and post-mine environments, for a total of eight experimental conditions. Each experimental condition involved replicates of various antecedent moisture conditions and rainfall intensities. The specific objective was to determine if the K values are different for pre- and post-mine soils. Mine locations were identified for experimentation in New Mexico, Wyoming, and the West Decker Mine in Montana.

Completion Date: Open

Reference: Office of Surface Mining
Brooks Towers, Second Floor
1020 15th Street
Denver, CO 80202

Stabilization of Topsoil Stockpiles

Wind erosion seriously threatens any area of low, variable precipitation, where drought is frequent, and temperatures, evaporation and wind speeds are high. The most serious damage from wind erosion is the separation and gradual removal of silt, clay, and organic matter from surface soils. Remaining materials may be sandy and infertile. The sand often piles up in dunes and presents a serious threat to more productive lands in the surrounding region. This project analyzed methods of controlling wind erosion from topsoil stockpiles set aside for the future reclamation of land for the Navajo Mine (Utah International, Inc.) located in the vicinity of Farmington, New Mexico. The stockpiles are highly susceptible to wind erosion due to the low precipitation, high temperatures, evaporation and erosion wind speeds that are prevalent in the area. The project primarily addressed the control of erosion through control of surface creep and saltation, based on the assumption that the sand component is the major constituent of the stockpiled material. Some fine constituents, silts and clays, may be winnowed from the surface area of the stockpile shortly after placement, but the remaining sand-sized material will form a protective "armor" for the stockpile if wind transport of the sands can be controlled. The project focused on the stabilization of reclamation stockpiles through control of the sand-sized component.

Completion date: 1981

Reference: Utah International, Inc.
PO Box 155
Fruitland, NM 87416
(505) 598-5861

Study of Sediment Control Structures for Small Areas in Surface Coal Mining

The objective of this study is to produce a state-of-the-art manual for the design of sediment control structures which are suitable for use on small areas in surface coal mining. The manual will contain a methodology for evaluating the performance of each structure. This procedure will provide a means of determining whether or not a particular structural design is capable of meeting the regional water quality and effluent limitations for settleable solids from mined lands. Design and construction standards will be provided, as well as maintenance and cost data.

An extensive literature review of current sediment control methods for surface coal mining was conducted and structure performance data gathered. Four structure groups have been identified for the manual.

1. Slope protection measures,
2. Diversion and conveyance structures,
3. Mechanical treatment measures, and
4. Detention and filtering structures.

Each structure group will share a common design approach, with design standards provided for each individual structure. The design approach utilizes a simplified sediment yield model which routes sediment by size fractions. The model provides estimates consistent with the more commonly used Universal Soil Loss Equation (USLE) for its base conditions (eastern agricultural land), but is more flexible in its applications to more complex conditions. A series of nomographs and worksheets will be provided for execution of the design procedure. The model makes use of existing data provided by NOAA weather atlases and SCS soils surveys.

Completion Date: March 28, 1981

Reference: Mr. Ken Lawver
Office of Surface Mining
Department of the Interior
Denver, CO

Water and Sediment Runoff Analysis and Design of Hydraulic Structures for Navajo Mine Areas I, II, and III South, New Mexico

Utah International, Inc. (UII) contracted SLA to do a study of 1) Navajo Mine and adjacent leases to determine the surface water hydrology and sediment transport characteristics for two conditions: present, and future mining or restoration with corrective measures, and 2) compile relevant surface water information necessary for permit application in the State of New Mexico.

The watersheds under investigation were complex and involved a variety of conditions ranging from disturbed mine areas to rangeland, and the best analysis tool requires use of a physical process model that can reflect changes in the watershed accurately and promptly. For this reason, the MULTSED model developed by SLA was chosen to evaluate the water and sediment runoff. The model uses a system of plane and subwatershed units linked together by channels, analogous to the natural channels, to represent the entire watershed. This allows for separation of key areas, such as the mine area, and a closer study of the watershed response. In addition, by using a physical process model the actual parameters that govern watershed response were altered to represent changes induced by mining activities.

The results from the MULTSED application on the coal mining areas, were used in the conceptual design of diversions, culverts, berms and impoundments. The final report also addressed a list of the New Mexico Surface Coal Mining Regulations and proposed methods of compliance.

Completion Date: 1981

Reference: Ed Pettigrew
Utah International, Inc.
P.O. Box 155
Fruitland, NM 87416

Water Balance and Seepage Computations for Pits 1 and 2 at United Nuclear Corporation's Churchrock Operations Mill

A water balance calculation was employed to determine seepage losses from Pits #1 and #2 at United Nuclear Corporation's Churchrock operation. The water budget was performed by using data collected from a monitoring system consisting of flow measurement devices at various inflow and outflow locations. Water-surface elevations were measured daily. Evaporation was estimated using an evaporation pan and appropriate pan correction coefficient. The evaluation showed that this method was not entirely applicable since the error in the flow measurement devices was greater than the seepage potential. A recommendation for use of well measurements surrounding the pits was made.

Completion date: August 1980

Reference: Mr. Don Silva
Science Applications, Inc.
501 Marquette N.W.
Suite 1100
Albuquerque, NM 87102
(505) 247-8787

Workshop in Sampling Requirements for Monitoring and Evaluation of Watershed Management Practices

This workshop, which was sponsored by the U.S. Environmental Protection Agency, was designed to instruct personnel directly associated with water monitoring networks on the concepts and techniques relevant for the design and evaluation of water quantity and quality monitoring systems. The scope of the lectures included: qualitative and quantitative descriptions of the physical processes governing watershed response (water, sediment, and pesticide runoff, effects of management practices, etc.); gaging methods for various water quantity and quality as well as meteorologic variables; construction and calibration of physical process models; spatial and temporal relation of gages and variables; time series analysis; assessment of the quality of data sets (identification of data inhomogeneities, correction of data inhomogeneities); identification of data insufficiency through the use of physical process simulation; and a case study in which the evaluation procedures were applied to an existing monitoring network.

Many examples were presented which applied the suggested evaluation procedures to existing data sets of water quality and quantity variables.

Completion Date: 1981

Reference: Mr. Orville Macomber
Environmental Protection Agency
Colorado Energy Research Institute
26 W. St. Clair
Cincinnati, OH 45268

Technical Review of the Permit Application Package for Trail Mountain Coal Mine, Emery County, Utah

This project consists of an evaluation of the analyses, findings and documentation necessary to issue a permit under the Surface Mining Control and Reclamation Act (SMCRA). The technical review is divided into three phases which include a determination of adequacy to commence the technical analysis (TA), completion of the technical analysis (TA), statement of findings and environmental assessment (EA), and preparation of the Secretarial decision document. The technical disciplines involved in the evaluation include groundwater and surface-water hydrology, geology, erosion and sedimentation, geomorphology, soils, range management, fish and wildlife biology, and mining engineering. Particular attention was focused on an evaluation of probable hydrologic consequences to the proposed mine areas and associated affected areas as a result of the mining operation. The area includes an evaluation of the probable consequences to surface water and groundwater quantity and quality resulting from mining and reclamation with respect to protection of the hydrologic balance.

Completion Date: April 1984

Reference: Ms. Shirley Lindsay
Office of Surface Mining
Western Technial Center
1020 15th Street
Denver, CO 80202
(303) 837-3806

Technical Review of the Permit Application Package for Wilberg, Deer Creek, and Des-Bee-Dove Mines, Emery County, Utah

This project consists of technical review of mining and reclamation plans for three underground coal mines operated by Utah Power and Light Company in Emery County, Utah. The technical review is being conducted in three parts to determine the adequacy of the permit application package, a review of the technical approach for various disciplines with a statement of findings, and preparation of the secretarial decision document and environmental assessment.

The review process is multidisciplined and Simons, Li & Associates has developed a project team with experts in groundwater and surface-water hydrology, geology, mining engineering, range management, soils, erosion and sedimentation engineering, fish and wildlife biology, and bonding. Particular attention was focused on an evaluation of probable hydrologic consequences to the areas affected by mining operations. The probable hydrologic consequences have been developed based on a thorough review of available literature and data available from the U.S. Geologic Survey, the State of Utah, and the Utah Power and Light hydrologic monitoring program.

Completion Date: April 1984

Reference: Ms. Shirley Lindsay
Office of Surface Mining
Western Technical Center
1020 15th Street
Denver, CO 80202
(303) 837-3806

Cumulative Hydrologic Impact Assessment - Huntington Creek Drainage Basin, Central Utah

Simons, Li & Associates is currently performing a hydrologic impact assessment of present and proposed underground coal mining activities in the 200 square-mile Huntington Creek drainage basin located in the Wasatch Plateau coal mining region of central Utah. Proposed mining activities of 15 mining companies are planned in this basin to approximately the year 2030. Cumulative effects are being tracked through time and relate to impacts on surface and groundwater quantity and quality. Downstream use is primarily agriculture and stock watering.

The geology of the region is complex with many fault planes providing secondary groundwater flow conduits through complex interbedded sedimentary formations. Data from four years of mine dewatering and monitoring at two mines in the basin are used to calibrate recharge and storage parameters for extrapolation to future mining activity in the basin and is coupled with USGS gage data to provide the basis for material damage assessment.

Completion Date: November 1983

Reference: Mr. Lynn Shown
Office of Surface Mining
Western Technical Center
1020 15th Street
Denver, CO 80202
(303) 837-5421

Cumulative Hydrologic Impact Assessment - Cottonwood Creek Drainage Basin, Central Utah

Simons, Li & Associates is currently performing a hydrologic impact assessment of present and proposed underground coal mining activities in the 200 square-mile Cottonwood Creek drainage basin located in the Wasatch Plateau coal mining region of central Utah. Proposed mining activities of 15 mining companies are planned in this basin to approximately the year 2030. Cumulative effects are being tracked through time and relate to impacts on surface and groundwater quantity and quality. Downstream use is primarily agriculture and stock watering.

The geology of the region is complex with many fault planes providing secondary groundwater flow conduits through complex interbedded sedimentary formations. Data from four years of mine dewatering and monitoring at two mines in the basin are used to calibrate recharge and storage parameters for extrapolation to future mining activity in the basin and is coupled with USGS gage data to provide the basis for material damage assessment.

Completion Date: November 1983

Reference: Mr. Lynn Shown
Office of Surface Mining
Western Technical Center
1020 15th Street
Denver, CO 80202
(303) 837-5421

Review of Mine Permit Application Package for John Henry No. 1 Mine, King County, Washington

Under a contract with the Office of Surface Mining, Simons, Li & Associates, Inc. is conducting a review of the mine permit application for a new surface coal mine. The mining plan and reclamation plan are being reviewed for compliance with the Surface Mining Control and Reclamation Act of 1977 (SMCRA). This project includes an administrative completeness review for compliance with applicable regulations, a technical analysis of the applicant's mining and reclamation plan to support a statement of findings and a secretarial decision document, and an environmental assessment prepared to comply with the National Environmental Policy Act (NEPA).

Significant hydrologic issues addressed by the technical and environmental analysis are the cumulative hydrologic impact of this mine on the surrounding area, the effects of mining operations on an adjacent lake, and evaluation of the applicant's plans for a final cut lake. The adequacy of the applicant's revegetation and reclamation plans is being assessed and the operational aspects of the mining plan evaluated. An in-depth study of the socioeconomic impacts of the mine is included as a supplement to the environmental assessment.

Completion Date: 1984

Reference: Mr. Ron Naten
U.S. Department of the Interior
Office of Surface Mining
Western Technical Center
1020 Fifteenth Street
Denver, CO 80202
(303) 837-5421

Technical Review of the Permit Application Package for Centralia Mine,
Thurston and Lewis Counties, Washington

The general review process is divided into three phases. Phase I is to review the mine plan and make an administrative completeness review to verify all required information data and analysis are included. Phase II is to prepare a Findings and Supporting Documentation and an Environmental Assessment. This phase establishes the rationale for proposed conditions of approval based on a comprehensive technical review. The final phase is the Decision Document, which identifies those data evaluated in making the required findings.

The technical expertise required for review of the Centralia Coal Mine includes surface and groundwater hydrology, geology, environmental sciences, mine engineering, social sciences and life sciences. For the mine plan review of the Centralia surface mine specific attention was given to the water quality and quantity analysis of surface and groundwater; the extensive system of sediment ponds, channels and culverts; and the water monitoring system. Other areas of specific interest were analysis of overburden, including compaction and erodibility, removal, and backfilling and grading.

Completion Date: April 1984

Reference: Mr. Steve Parsons
Office of Surface Mining
Western Technical Center
1020 15th Street
Denver, CO 80202
(303) 837-5421

Administrative Completeness Review of Mine Permit Application Package for Palmer Coking Coal Company, McKay - Section 12 Mine

Simons, Li & Associates, Inc. is conducting a review of the mine permit application to support the Office of Surface Mining in the permitting process for this existing surface coal mine and processing plant. The application is being reviewed for completeness in response to the Surface Mining Control and Reclamation Act (SMCRA) regulations and to determine if the information contained in the application is adequate for environmental and technical analyses to support a decision by the Secretary of the Interior on the permit application.

The mining operation qualifies for assistance under the Small Operator Assistance Program (SOAP) through which information on baseline hydrologic and geologic data and possible hydrologic impacts is being provided to the operator by OSM. The contract for the SOAP studies is being reviewed along with the permit application to ensure that all information required for further detailed analysis will be available.

Completion Date: 1983

Reference: Mr. Bennett Young
U.S. Department of the Interior
Office of Surface Mining
Western Technical Center
1020 Fifteenth Street
Denver, CO 80202
(303) 837-5656

II. PROJECT TEAM, SCHEDULE AND MISCELLANEOUS SUPPORTING INFORMATION

2.1 Project Team

The team proposed for this project is selected from SLA's staff and from specific individual consultants. Daryl B. Simons, Principal Engineer and President of SLA, will provide senior level review of the project. Dr. Simons will serve in a technical review capacity as well as insure the project is completed in accordance with project schedules. The responsibilities and availabilities of remaining SLA and SLA Consultant personnel are provided in Table 2. Detailed resumes follow. A summary of staff experience appears in Table 3. A more detailed summary of SLA consultants experience relevant to this proposal follows Table 3.

2.2 Project Schedule

Simons, Li & Associates, Inc. has reviewed the schedule supplied with the bid request and finds it satisfactory. We anticipate no difficulty in meeting the desired schedule. SLA is experienced in responding rapidly to our clients' needs, and frequently performs major projects in less than the time constraints presented.

2.3 Miscellaneous Information

SLA has reviewed the special instructions supplied in the statement of work. Those not already addressed are well understood and acceptable. In particular, no staff member or outside consultant has worked for the West Appa Coal Company during the past three years, and it is agreed that no work will be performed for that company for a period of one year following the completion of the contract should it be awarded to SLA. Reporting requirements as specified are also agreeable.

Types of Technical Analyses and Support to the MRP Review Process

Table 1. continued

Project Name with Related Experience	Firm	Runoff and Precipitation	Sediment Ponds and Erosion Control	Effluent Evaluation	Infiltration/Runoff	Aquifer Evaluation	Groundwater Uses	Post-mining Aquifer	Channel Geomorphology	Hydrologic Monitoring	Overburden	Water Quality Data	Post-mining Topography	Vegetation Restoration	Subsidence	Floodplain Mapping	Flood Irrigation	Reclaimed Soil Depth	Mass Stability	Fugitive Dust	Land Unsuitable for Mining	Ownership Maps	Socioeconomic	Bond Calculations	Land Use	Overall Permit Consistency	Fish and Wildlife
11. Field Investigation and Infiltrometer Tests, GEC Florence Mine	SLA				●							●															
12. Hydrologic Analysis and Monitoring of the GEC Florence Mine Watershed	SLA	●	●	●	●					●		●															
13. Surface Water Hydrology and Sedimentology Manual	SLA	●																									
14. Water Balance and Seepage Computation for Pits 1 and 2 at United Nuclear Corporation's Church Rock Mill	SLA			●	●																						
15. Design Manual for Sediment Ponds	SLA	●	●	●																							
16. Design Manual for Small Area Erosion Control	SLA	●	●	●																							
17. Investigation of the Stability of the Uranium Tailings Disposal Site at United Nuclear Corporation's Church Rock Mill	SLA		●						●										●								
18. Effect of Floodplain Regulations on Inland Port Facilities	SLA																					●	●	●			
19. Design of Hydrologic Monitoring System, Great American Coal Company	SLA				●					●																	

Table 1: continued

Project Name with Related Experience	Firm	Types of Technical Analyses																									
		Runoff and Precipitation	Sediment Ponds and Erosion Control	Effluent Evaluation	Infiltration/Runoff	Aquifer Evaluation	Groundwater Uses	Post-mining Aquifer	Channel Geomorphology	Hydrologic Monitoring	Overburden	Water Quality Data	Post-mining Topography	Vegetation Restoration	Subsidence	Floodplain Mapping	Flood Irrigation	Reclaimed Soil Depth	Mass Stability	Fugitive Dust	Land Unsuitable for Mining	Ownership Maps	Socioeconomic	Bond Calculations	Land Use	Overall Permit Consistency	Fish and Wildlife
40. Preparation of Several Aspects of an MRP for a Surface and Underground Coal Mine, WY	SLAC									●		●	●					●								●	
41. Development of an MRP and Experimental Practice Plan for a Surface Coal Mine, CO	SLAC				●		●			●		●	●						●					●	●	●	
42. Coordinated Development of USFWS Publication "An Environmental Guide to Western Surface Mining, Part II: Impacts, Mitigation and Monitoring"	SLAC											●	●					●			●			●			

*SLAC represents work completed by members of SLA's team of special consultants.

Table 2. Personnel Assignments.

Individual	Project Assignment	Availability (% time available as of March 15, 1983)
<u>SLA</u>		
Daryl B. Simons	Project Review	5
Bradley A. Anderson	Project Manager	30
Paul E. Clopper	Groundwater Hydrology	40
George K. Cotton	Surface Water Hydrology	40
Rebecca M. Summer	Geology & Soil Science	40
Charles W. Binder	Civil Engineering	50
Mark R. Peterson	Surface Water and Groundwater Hydrology	50
<u>SLA Consultants</u>		
Steven R. Viert	Vegetation/Range Management	40
Stephen G. Long	Revegetation/Soils	40
T. Michael Phelan	Fish and Wildlife/Cultural Resource	40
Debbie L. Richardson	Mining Engineering/Blasting/ Geotechnical	30

Table 3. Summary of Experience.

	SLA Personnel							SLA Consultants			
	DBS	BAA	PEC	RMS	GKC	CWB	MRP	SRV	SGL	TMP	DLR
Civil Engineering	x	x	x		x	x	x				x
Surface Water Hydrology	x	x	x		x		x				
Groundwater Hydrology		x	x				x				
Geology	x			x		x					x
Soil Science				x			x	x			
Fish and Wildlife Biology							x		x		
Mining Engineering											x
Blasting	x										x
Plant Ecology							x	x			
Range Management							x	x	x		
Coal Mine Permitting	x	x	x	x	x	x	x	x	x	x	x
Mine Land Reclamation	x	x	x	x			x	x	x	x	x
Utah CMRPP							x	x			
Subsidence				x							x
Land Use		x	x		x		x	x			
Cultural Resources							x	x			
Climatology							x				
Alluvial Valley Floors		x	x	x							

DBS - Daryl B. Simon
 BAA - Brad A Anderson
 PEC - Paul E Clopper
 RMS - Rebecca M. Summer
 GKC - George K. Cotton
 CWB - Chuck W. Binder

MRP - Mark R. Peterson
 SRV - Steven R. Viert
 SGL - Stephen G. Long
 TMP - T. Michael Phelan
 DLR - Debbie L. Richardson

Daryl B. Simons
President and Principal Engineer
Simons, Li & Associates, Inc.

EDUCATION

Utah State University: B.S. in Civil Engineering, 1947
Utah State University: M.S. in Civil Engineering, 1948
Colorado State University: Ph.D. in Civil Engineering, 1957

REGISTRATION

Registered Professional Engineer in Colorado, Wyoming, and Arizona

TECHNICAL SOCIETIES

American Society of Civil Engineers, Fellow
American Geophysical Union, Member
International Association of Hydraulic Research, Member
International Commission on Irrigation and Drainage, Member

HONORS

J. C. Stevens Award, American Society of Civil Engineers, 1960
Croes Award, American Society of Civil Engineers, 1964
Outstanding Professional Engineer in Colorado, 1973
Karl Emil Hilgard Hydraulic Prize, American Society of Civil Engineers, 1979

SELECTED NATIONAL COMMITTEES

Chairman, ASCE Committee on Regulation and Stabilization of Rivers, 1968-1970
Chairman, UCOWR Committee on Education and Research in Water Resources Engineering, 1970-1971
Chairman, ICID Committee on Collection and Publication of Data Relating to Design of Channels (in regime as well as non-regime), 1969-present
Member, IAHR Committee on Fluvial Hydraulics, 1969-1975
Member, National Subcommittee for the Study of Types of Revetment of the Permanent International Association of Navigation Congresses, 1973
Member, Executive Committee, U.S. Committee on Irrigation, Drainage, and Flood Control, 1976-present

PUBLICATIONS

Fluid Mechanics for Engineers, Prentice-Hall, Inc., 1960

Sediment Transport Technology, Water Resources Publications, 1977

Over 250 technical papers in the fields of hydraulics, river mechanics, hydrology, and water resources development

EXPERIENCE SUMMARY

Dr. Simons is a world-renowned engineer in the fields of hydraulics, hydrology, river mechanics, hydraulic modeling, and hydraulic structure design. Dr. Simons has supervised over 300 water-related projects, including hydrology, hydraulics, flood control, river geomorphology, sediment transport, water and sediment routing, data storage and retrieval system, navigation, water resources development, data collection, physical modeling, gravel mining permit applications and impact analysis, and hydraulic and erosion analysis of bridges.

Prior to forming Simons, Li & Associates, Inc., Dr. Simons was a professor at the University of Wyoming; Project Chief for the U.S. Geological Survey to conduct research in fluvial hydraulics; and Associate Dean for Engineering Research and Professor of Civil Engineering at Colorado State University. He has served as a hydraulic consultant on numerous engineering projects for the United Nations and federal government agencies dealing with watersheds, river mechanics, flood control, and navigation problems. He has also served on national and international panels delegated to outline research needs in hydraulics, irrigation and drainage, and water resources development.

Bradley A. Anderson
Water Resources Engineer
Simons, Li & Associates, Inc.

EDUCATION

North Dakota State University: B.S. in Civil Engineering, 1974
Colorado State University: M.S. in Civil Engineering, 1982

REGISTRATION

Registration for Professional Engineer in Colorado forthcoming.

EXPERIENCE SUMMARY

Mr. Anderson joined Simons, Li & Associates, Inc. in January 1981. Since joining SLA, he has actively engaged in data collection studies, groundwater exploration and development investigations, regional hydrologic analysis and municipal water development studies. He has also assisted in developing design manuals and texts related to mineland reclamation, urban drainage and analysis of fluvial systems.

During the data collection studies, Mr. Anderson became involved in river cross-sectional surveys, bed and bank material sampling and analysis, and the collection of stream gaging data. Through these studies, he became proficient in the operation of the standard stream gaging and sediment sampling equipment. In the past year, four groundwater exploration and development investigations familiarized Mr. Anderson with the analysis of groundwater availability, evaluation of aquifer parameters and the development of monitoring well and production well fields. During these investigations, he also assisted in identifying the most desirable well locations, determining the well specifications, designing the well, supervising well completion and development and initiating appropriate permitting procedures. The regional hydrologic analyses enabled Mr. Anderson to evaluate streamflow records and perform water supply versus water demand studies for the Missouri River and Powder River Basins.

Recently, Mr. Anderson managed a project involving the preliminary design of a municipal water distribution system. The project included a preliminary system layout and design, preliminary water distribution network analyses, financial analysis and development of repayment schedules, and preparation of funding applications.

Paul E. Clopper
Water Resources Engineer
Simons, Li & Associates, Inc.

EDUCATION

University of California, Davis B.S. in Civil Engineering, 1978
Colorado State University M.S. in Civil Engineering, 1980

REGISTRATION

Engineer-In-Training, California

TECHNICAL SOCIETIES

American Society of Civil Engineers
National Society of Professional Engineers

PUBLICATIONS

"Predicting Leachate Generation Using USDA Methods," Technical Paper presented at the Fall Technical Conference of the National Solid Waste Management Association, Salt Lake City, Utah, October 1982.

"A Data-Based Evaluation of the SCS Curve Number Method," to be presented at the ASCE Special Symposium, Jackson Hole, Wyoming, July 1983.

EXPERIENCE SUMMARY

Mr. Clopper joined Simons, Li & Associates, Inc. in April 1983. Prior to joining SLA, he worked as a hydrogeologist and water resources engineer for Warzyn Engineering, Inc., an engineering consulting firm based in Madison, Wisconsin. While there, he was responsible for the hydraulic/hydrologic evaluation of three Wisconsin dam sites under the National Federal Dam Safety Inspection Program. Analysis included development of PMF design hydrographs, reservoir routing, and dam-break simulation. He is also experienced in the design of sedimentation and detention basin networks.

Mr. Clopper participated in the design of numerous municipal and private landfills around the Wisconsin area and is familiar with state and federal regulations dealing with the disposal of solid and hazardous waste. He conducted several groundwater contamination studies and is practiced in monitoring well drilling procedures and in field sampling of soil and water, including volatile organic sampling protocol. In addition, he has experience in the classification of soil samples for borehole logging.

Mr. Clopper is also familiar with computer modeling and has written a program to predict leachate generation rates in sanitary landfills for various combinations of cover soil types, thicknesses, vegetative cover, and climatic conditions. He also helped develop criteria for drainage swale sizing and spacing on steep slopes for erosion protection based on the Universal Soil Loss Equation, including the evaluation of various channel lining materials.

Rebecca M. Summer
Senior Geologist/Geomorphologist
Simons, Li & Associates, Inc.

EDUCATION

University of Minnesota:	B.A. in Geology,	1973
University of Texas:	M.A. in Geology,	1975
University of Colorado:	Ph.D. in Geomorphology,	1980

TECHNICAL SOCIETIES

Soil Science Society of America, Society of Agronomy, Member
Soil Conservation Society of America, Member

PUBLICATIONS

Over 15 published technical papers, geologic field guides, and summaries in the fields of geomorphology, soil, and reclamation.

EXPERIENCE SUMMARY

Dr. Summer is primarily responsible for geomorphic, geologic, hydrogeologic and soils analyses on projects for SLA. Presently she is collecting and analyzing groundwater data on shallow and deep aquifers, surface water, and hydrogeologic data in the western states. She is also working on a coal slurry pipeline project in the Missouri basin. She has collected water quality data on gravel mine sites and studied baseline geomorphic characteristics of alluvial valley fill in New Mexico, which included assessment of coal and uranium mining as it impacts near-surface aquifers, downstream erosion and sedimentation. Dr. Summer has completed a design manual for sediment control structures on small areas at surface coal mining sites. This work includes analysis and design specifications for mechanical treatments and revegetation, as well as data requirements and acquisition for the sediment yield model and overall costs of erosion control structures and treatments. She has also developed a rock durability evaluation procedure as part of a diversion design manual for mining in the eastern coal-producing states. As project hydrologist/geomorphologist, she assisted in defining sediment loss and sediment yield from an alluvial valley in the Tucson Basin. Dr. Summer contributed to the text used for short courses and a publication on engineering analysis of fluvial systems by Simons, Li & Associates, Inc.

Dr. Summer has done research for the U.S. Geological Survey, Water Resources Division, dealing with baseline data on erodibility and soil loss from different geomorphic landforms underlain by coal. She has operated a rainfall simulator for the purpose of monitoring raindrop splash erosion, runoff, and sediment production from semiarid badlands in New Mexico and alpine wildlands in Colorado. In addition, she has experience with natural hazards mapping, monitoring and evaluating geomorphic change and stability of trails and terrain, and research in reclamation of sand and gravel mines.

Completion of her dissertation required mapping and classifying soils, landforms and vegetation on the Front Range of Colorado and defining the variability and distribution of soil erodibility. As a research associate, she used remote sensing techniques, particularly color infrared photography and imagery, to map landforms, vegetation and natural hazards for a montane land-use planning project at the University of Colorado and a multiple-use project for the U.S. Forest Service. While working for the Bureau of Economic Geology, Austin, Texas, Dr. Summer used LANDSAT imagery to map land-use patterns in the State of Texas, and mapped fluvial deposits, groundwater movement, vegetation, soils, and land use in a mining area along the Colorado River, Texas.

Charles W. Binder
Water Resources Engineer
Simons, Li & Associates, Inc.

EDUCATION

Colorado State University: B.S. in Agricultural Engineering, 1978
Colorado State University: M.S. in Civil Engineering, 1981

REGISTRATION

Registered Professional Engineer in Colorado and forthcoming in Utah

TECHNICAL SOCIETIES

American Society of Agricultural Engineers, Associate Member
American Society of Civil Engineers, Associate Member

EXPERIENCE SUMMARY

Mr. Binder has more than three years of experience in engineering consulting in the areas of water rights engineering, hydrology, hydraulics, groundwater, water supply, and municipal water facilities design. He has also had extensive experience in research in the areas of improving irrigation practices, irrigation return flow, salinity control projects, and water quality monitoring.

Mr. Binder has served as project engineer or project manager on several different types of engineering projects. These projects include water rights transfers, water resources planning and development, groundwater studies, evaporation and evapotranspiration studies, design of water diversion facilities, pumping plant and pipeline design, planning of telemetry systems to monitor and control water systems, and construction supervision and inspection.

Mr. Binder has had considerable experience with water rights transfers and augmentation plans. His specific experience includes analyzing the historic use of various water rights to determine appraisal value or feasibility of use in a transfer, determining the dependability of a particular water right, ascertaining the specific water requirements for the new use in a transfer, and formulating the methodologies to accomplish the augmentation requirements.

Mr. Binder gained extensive research experience at Colorado State University while achieving the position of Research Associate. His collection and analysis of field data, literature review, and computer modeling projects were conducted in the areas of on-farm water management practices, salinity control technologies, and irrigation performance prediction. Mr. Binder was involved in the design, data collection, and analysis of the water quality monitoring network for the Grand Valley Salinity Control Demonstration Project. Mr. Binder co-authored the project data report and the salinity control technology report.

Mark R. Peterson
Civil Engineer
Simons, Li & Associates, Inc.

EDUCATION

Colorado State University:	B.S. in Civil Engineering,	1980
Colorado State University:	M.S. Candidate in Civil Engineering,	1983

EXPERIENCE SUMMARY

Mr. Peterson joined Simons, Li & Associates, Inc. (SLA) in October, 1980. As a member of the Engineering Services Division, Mr. Peterson is involved with field data collection, workshops and short courses, and a variety of hydraulic, erosion and sedimentation studies, particularly those related to gravel mining and litigation studies. Additionally, he is often involved with instrumentation and data collection efforts on laboratory physical model studies. His experience encompasses stream gaging, sediment sample collection, river surveying, site reconnaissance, utilization of rainfall simulation systems, laboratory sediment analysis techniques, and mathematical modeling of watershed and river systems.

Most recently Mr. Peterson has worked on projects dealing with erosion and sedimentation studies on Three Mile Creek in Alabama and Calabacillas Arroyo in New Mexico, engineering analysis of Nonconnah Creek in Tennessee for litigation support, and a supplement to the Final Environmental Impact Statement of the water marketing program for Ruedi Reservoir in Colorado. Other experience at SLA has included preparation of a design manual for surface mine diversions, evaluation of soil erodibility on surface coal mines in New Mexico and Montana using rainfall simulation techniques, and laboratory testing ofrevet mattress stability. These projects have entailed responsibility for field crews, development of instrumentation and data acquisition methodologies, utilization of computer models to evaluate water and sediment yields, and preparation of literature reviews and reports.

While pursuing his undergraduate degree, Mr. Peterson worked part-time as a laboratory assistant at Colorado State University. During this time he gained experience in field data collection and helped to design and fabricate research apparatus. Immediately prior to joining SLA, he worked for a local

civil engineering consulting firm on projects involving the development of urban water supply systems.

STEPHEN LONG

Mr. Stephen Long will be responsible for the review of the revegetation and soils baseline sections of the permit application. Steve has conducted mine audits (permit application and field reviews similar to OSM inspections) for 21 active underground and surface mining operations, and was involved in conducting OSM completeness and technical reviews for two mines in Western Colorado. Steve also served as a strip mine inspection officer for the Ohio Department of Natural Resources for two years. Responsibilities included premining application, map, and field reviews to determine potential reclamation feasibility and conformity with regulations.

Steve has been involved in the development of three major coal mine permits in the states of Utah, Montana, and Wyoming. Tasks completed included reclamation section management, revegetation plan development, engineering plan review, assistance with soils baseline determination, and final report editing. In addition, Steve has completed revegetation plans for 17 other operations within the Western United States and has assisted in the field work and report preparation of four Order 1 soil surveys.

Steve has authored two publications which will aid in the technical review of the permit application; Characteristics of Plants Used in Western Reclamation details the adaptive characteristics and uses of 52 plant species commonly used in western reclamation; and Handbook of Reclamation Techniques to be published by the U.S. Forest Service this year, which analyzes and details the proper use of 46 techniques and materials commonly used in revegetation programs.

MICHAEL PHELAN

Mr. Mike Phelan will be responsible for review of the Wildlife and Archaeological sections of the permit application. Mike's experience includes the management and design of wildlife studies and the subsequent technical and editorial preparation of the wildlife baseline and Fish and Wildlife Plan portions of over ten coal mining permit applications. In addition, Mike was responsible for archaeological sections (compilation and editing) of other permit applications.

Mike has also completed, for the OSM, a review for technical adequacy and completeness of the wildlife portions of two coal mining permit applications in Western Colorado. In addition to the above experience, Mike was a contributing author to An Environmental Guide to Western Surface Mining, Part Two: Impacts, Mitigation, and Monitoring, a U.S. Fish and Wildlife publication using a multi-disciplinary approach to analyzing the effects of surface mining on the fish and wildlife resources of the Western United States.

DEBORAH L. RICHARDSON

EXPERIENCE

January, 1983 to Present

Currently employed as a partner in Richardson Assoc., Mining/Environmental Consultants. Responsibilities include marketing for the partnership, technical and administrative management of projects, and technical responsibilities in areas dealing with mining engineering. Experience includes:

- o Evaluation of subsidence impacts from six underground operations in Utah. Several of the operations were experiencing fracturing at the surface due to mining adjacent to steep slopes. Another operation was planning a partial extraction operation under a major river.
- o Assessment of bonding estimates for several mines in the eastern and western U.S. Equipment utilization and productivity were evaluated to determine cost requirements.
- o Review of stability evaluations on several major fill constructions, coarse and fine coal refuse disposal sites, and a development waste disposal site for an underground mine.
- o Assessment of backfilling and grading operations for three mines in New Mexico. Operations were evaluated to determine if it was feasible to achieve the proposed postmining topography. The mines utilized a combination of dragline and truck and shovel operations.

August, 1979 to January, 1983

Project manager/mining engineer for Fred C. Hart Associates, Inc., a consulting firm. Responsibilities included the technical and administrative management of many projects in the energy and environmental fields and coordination of marketing efforts. Experience included:

- o Analysis of the economic impact of regulations promulgated under the Surface Mining Control and Reclamation Act and revised regulations proposed in 1982. This analysis included mine design and cost estimation for backfilling, drilling and blasting, and topsoil handling operations.
- o Technical review of over 30 mining and reclamation plans for compliance with the surface mining regulations in eastern and western U.S. These reviews required the evaluation of the overall mining operation, along with the assessment of the geologic setting and coal recovery.
- o Development of a manual evaluating techniques for the analysis of groundwater impacts resulting from mining operations in the Western U.S.
- o Feasibility analysis of techniques for the disposal of spent oil shale and oil shale fines at the Anvil Points surface retort facility.

- o Assessment of several abandoned hazardous waste disposal sites for possible environmental impacts and development of impact mitigation plans. These studies required the evaluation of the geologic formations at the sites, development of alternative disposal techniques, and risk assessments.
- o Review of state permit requirements for opening and operating a coal mine in several states in the U.S., and development of a permit acquisition strategy.
- o Evaluation of uranium tailings disposal sites for potential groundwater impacts.

March, 1976 to August, 1979

Worked as a research and teaching assistant for the Mineral Engineering Department of the Pennsylvania State University.

Responsibilities included:

- o Assessment of coal preparation techniques for the removal of pyrite and the concentration of coal macerals.
- o Comparison of overburden characteristics with the quality of mine drainage in several mines.
- o Analysis of pyrite characteristics affecting the formation of acid mine drainage.
- o Development of a manual for planning considerations for control of mine drainage.
- o Review of basic electrical engineering principles for students in a Mine Plant Design course.

EDUCATION

Master of Science in Mining Engineering from the Pennsylvania State University; August, 1979.

Bachelor of Science in Geology from the Pennsylvania State University; March, 1975.

Awarded National Science Foundation Fellowship; September, 1978.

PUBLICATIONS

Richardson, Deborah L., A Study of the Occurrence of Pyrite in Coal and Its Relationship to Liberation in Coal Preparation and Acid Mine Drainage Formation, M.S. Thesis, Pennsylvania State University, 126 pages, 1979.

Richardson, D.L., and H.L. Lovell, "Pyrite Liberation in Coal - Key to Sulfur Reduction During Beneficiation", Coal Conference and Expo V, Louisville, Kentucky, October, 1979.

Richardson, D.L., "Assessment of Impacts to Surface Coal Mine Operators Due to Changes in Surface Mining Regulations", 1982 Symposium on Surface Mining Hydrology, Sedimentology, and Reclamation", Lexington Kentucky, December, 1982.

CERTIFICATIONS

Received Engineering-in-Training Certificate from the State of Pennsylvania; September, 1978.

STEVEN VIERT

Mr. Steven Viert will be responsible for the review of Land Use, Climatology, Range Management, and Vegetation sections of the permit application. Steve has been involved in SMCRA compliance studies and other aspects of permitting coal mines since SMCRA's inception in 1977. Initially he designed and implemented baseline compliance studies for the disciplines of vegetation, wildlife, land use, and the statistical criteria for determination of revegetation success. This initial experience was gained on over 20 coal mining projects within the states of Utah, Colorado, Wyoming, North Dakota, and Arizona.

Steve has managed two major permitting projects to successful conclusion. One project involved preparation of major aspects of a successful permit application (one of the first in Utah) for a deep mine in the Book Cliffs of Utah. Responsibilities included four baseline studies and the entire reclamation plan. The other project involved management of the complete (and successful) permit application for a 12 million TPY surface coal mine in Wyoming. This project included collection of all adjudication materials, WDEQ/OSM compliance studies for ten baseline categories, mine engineering, and reclamation planning.

In addition to design of compliance studies and preparation of entire applications, Steve has had occasion to review, in an audit capacity, the permit applications of other coal mines. Audits were usually for coal companies prior to submittal of the application, however, occasion audits were formal agency (OSM) reviews for "Apparent Completeness" and/or "Technical Adequacy". Audits usually involved compliance reviews for vegetation, wildlife, land use, and revegetation.

PHASE I

APPARENT COMPLETENESS REVIEW

I. LABOR COST

<u>Topical Area</u>	<u>Rate</u>	<u>Hours</u>	<u>Cost</u>
<u>Civil Engineering</u>			
Engineer	\$31.00	8	\$ 248
<u>Surface Water Hydrology</u>			
Senior Engineer	\$42.50	24	1,020
Engineer	\$31.00	16	496
<u>Groundwater Hydrology</u>			
Senior Engineer	\$42.50	20	850
Engineer	\$31.00	12	372
<u>Soil Science</u>			
Senior Scientist	\$28.00	20	560
<u>Mining Engineering/Geology/Blasting</u>			
Senior Mining Engineer	\$30.00	40	1,200
Senior Scientist	\$35.00	16	560
<u>Fish and Wildlife Management</u>			
Senior Scientist	\$28.00	16	448
<u>Climatology/Air Quality</u>			
Senior Scientist	\$28.00	4	112
<u>Range Management/Land Use/Revegetation</u>			
Senior Reclamation Specialist	\$28.00	30	840
<u>Cultural Resources</u>			
Senior Scientist	\$28.00	4	112
<u>Management/Support</u>			
Principal Engineer/Scientist	\$65.00	4	260
Project Level Manager	\$42.50	16	680
Clerical	\$21.00	16	336

PHASE I (continued)

II. OTHER COSTS

Travel (3 airfares to Salt Lake City)	\$ 450
Per diem - 3 days @ \$55/day	165
Telephone	40
Copying	40
Work Processor Rental - 16 hours @ \$8/hr	<u>128</u>

Subtotal 823

III. TOTAL PHASE I

\$8,917

PHASE II

DETERMINATION OF COMPLETENESS

I. LABOR COST

<u>Topical Area</u>	<u>Rate</u>	<u>Hours</u>	<u>Cost</u>
<u>Civil Engineering</u>			
Engineer	\$31.00	4	\$ 124
<u>Surface Water Hydrology</u>			
Senior Engineer	\$42.50	8	340
Engineer	\$31.00	8	248
<u>Soil Science</u>			
Senior Scientist	\$28.00	8	224
<u>Mining Engineering/Geology/Blasting</u>			
Senior Mining Engineer	\$30.00	20	600
Senior Scientist	\$35.00	8	280
<u>Fish and Wildlife Management</u>			
Senior Scientist	\$28.00	6	168
<u>Climatology/Air Quality</u>			
Senior Scientist	\$28.00	2	56
<u>Range Management/Land Use/Revegetation</u>			
Senior Reclamation Specialist	\$28.00	16	448
<u>Cultural Resources</u>			
Senior Scientist	\$28.00	2	56
<u>Management/Support</u>			
Principal Engineer/Scientist	\$65.00	4	260
Project Level Manager	\$42.50	12	510
Clerical/Drafting	\$21.00	8	168

PHASE II (continued)

II. OTHER COSTS

Travel (3 airfares to Salt Lake City)	450
Per diem - 3 day @ \$55/day	165
Telephone	40
Copying	40
Work Processor Rental - 8 hours @ \$8/hr	<u>64</u>

Subtotal 759

III. TOTAL PHASE II

\$ 4,829

PHASE III

FINDINGS AND SUPPORTING DOCUMENTATION

I. LABOR COST

<u>Topical Area</u>	<u>Rate</u>	<u>Hours</u>	<u>Cost</u>
<u>Civil Engineering</u>			
Engineer III	\$31.00	16	\$ 496
<u>Surface Water Hydrology</u>			
Senior Engineering Engineer	\$42.50	30	1,275
	\$31.00	40	240
<u>Groundwater Hydrology</u>			
Senior Engineer	\$42.50	36	1,530
Engineer	\$31.00	44	1,364
<u>Soil Science</u>			
Senior Scientist	\$28.00	36	1,008
<u>Mining Engineering/Geology/Blasting</u>			
Senior Mining Engineer	\$30.00	16	1,9080
Senior Scientist	\$35.00	16	560
<u>Fish and Wildlife Management</u>			
Senior Scientist	\$28.00	16	448
<u>Climatology/Air Quality</u>			
Senior Scientist	\$28.00	8	224
<u>Range Management/Land Use/Revegetation</u>			
Senior Reclamation Specialist	\$28.00	56	1,568
<u>Cultural Resources</u>			
Senior Scientist	\$28.00	12	336
<u>Management/Support</u>			
Principal Engineer/Scientist (SLA)	\$65.00	8	520
Project Level Manager (SLA)	\$42.50	24	1,020
Clerical/Drafting (SLA)	\$21.00	40	840

PHASE III (continued)

II. OTHER COSTS

Travel (3 airfares to Salt Lake City)	450
Per diem - 3 day @ \$55/day	165
Telephone	50
Copying	50
Work Processor Rental - 40 hours @ \$8/hr	<u>320</u>

Subtotal 1,035

III. TOTAL PHASE III

\$15,444

COST SUMMARY

Phase I - Apparent Completeness Review	\$ 8,917
Phase II - Determination of Completeness	4,829
Phase III - Technical Analysis	<u>15,444</u>
	<u>\$29,190</u>

STATE OF UTAH
INVITATION AND BID
REQUEST FOR PROPOSAL



PAGE 1 OF 1 PAGES

STATE OF UTAH
DIVISION OF PURCHASING
2112 STATE OFFICE BLDG.
SALT LAKE CITY, UTAH 84114

DATE December 07, 1983

REQUISITION NO. 580322

DEPARTMENT Natural Resources

Bids properly marked as to Bid No., Date and Hour of Opening, subject to the conditions herein stipulated and in accordance with the specifications set forth and/or attached hereto, will be accepted in the office of the DIVISION OF PURCHASING, Room 2112, State Office Building, Salt Lake City, Utah 84114, prior to following date and time.

DATE December 20, 1983 TIME 10:30 A.M. P.M.

ALL INQUIRIES AND CORRESPONDENCE TO BE ADDRESSED TO: Becky Curtis PHONE: 533-4618

QUOTE PRICES F.O.B. DESTINATION SEE FREIGHT BID REQUIREMENT SHEET

DELIVERY LOCATION 4241 State Office Bldg, SLC, Utah 84114

ITEM NO.	QUANTITY	DESCRIPTION	UNIT PRICE	FREIGHT CHARGE IF APPLICABLE	TOTAL
		Brand names and model numbers must be furnished with bid.			
		CONTRACT: TECHNICAL ASSISTANCE IN PERMIT REVIEW RELATED TO THE COAL MINING AND RECLAMATION PERMANENT PROGRAM, as per attached specifications:			
		TOTAL PHASE I, II, III (see attached)	\$8,917.00		
			4,829.00		
			15,444.00		\$29,190.00

Cash discounts of less than 30 days will not be considered in awarding.

IMPORTANT: PLEASE READ
FAILURE TO SIGN THIS PROPOSAL IN INK WILL RESULT IN THIS BID BEING REJECTED.

Cash discount terms _____ Company Simons, Li & Associates, Inc.

Requested Delivery Date _____ Address 3555 Stanford Road

Fort Collins, CO 80526

ZIP CODE

THIS MUST BE NOTED

Please quote number of calendar days required for delivery after receipt of purchase order

Telephone (303) 228-4100

Signature *Richard J. ...*

_____ days.

Title Executive Vice President

NOTE: See terms and conditions governing bids and sales to State on Reverse side.

SIMONS, LI & ASSOCIATES, INC.

3555 STANFORD ROAD
POST OFFICE BOX 1816
FORT COLLINS, COLORADO 80522

TELEPHONE (303) 223-4100
TLX: 469370 SLA FTGN CI
CABLE CODE: SIMONSLI

December 19, 1983

Department of Administrative Services
Division of Purchasing
2112 State Office Building
Salt Lake City, UT 84114

Attention: Ms. Boucek

Re: Req. No. 580322
(Our proposal number: XUT-DOGM-01)

Dear Ms. Boucek:

Simons, Li & Associates, Inc. (SLA) is pleased to submit the enclosed proposal for preparing the ACR, DOC and FSD for the West Appa Coal Company, Rilda Canyon Mine. The enclosed qualifications statement includes price documentation, a list of the key personnel, their background, project responsibilities, availabilities, and resumes.

If awarded the contract, SLA agrees to perform the work outlined in the Statement of Work for the firm fixed price listed on the Bid Proposal Form. The proposed time frame is acceptable. SLA management has reviewed the organizational conflicts of interest and concludes there are no conflicts of interest.

If you have any questions concerning the proposal, do not hesitate to contact me.

Sincerely yours,



Ruh-Ming Li
Executive Vice President

BAA/bbv
PD83-33/P272CL

Enclosures

DENVER OFFICE: 4105 EAST FLORIDA AVENUE, SUITE 300, DENVER, COLORADO 80222 (303) 692-0369
TUCSON OFFICE: 120 W. BROADWAY, SUITE 260, P.O. BOX 2712, TUCSON, ARIZONA 85702 (602)884-9594
CHEYENNE OFFICE: 1780 WESTLAND ROAD, CHEYENNE, WYOMING 82001 (307) 634-2479
PITTSBURGH OFFICE: 724 FIELD CLUB ROAD, PITTSBURGH, PENNSYLVANIA 15238 (412) 963-0717
NEWPORT BEACH OFFICE: 4020 BIRCH ST., SUITE 104, NEWPORT BEACH, CA 92660 (714) 476-2150

ADDENDUM TO RECORDS TRANSFER

Please submit original to Utah State Archives and Records Service, Room 28, State Capitol Building

From (Agency)		Accession Number:
Date Received in Records Center:		Page Number:
<p>Agency ARCHIVE November 8, 1988</p>		
Box Number	Description and Date of Records in Each Box	Records Center Box Number
<u>Box 45</u>	<p>CO-OP MINING COMPANY BEAR CANYON MINE ACT/015/025</p> <p>Determination of Completeness (DOC) TD Response DOGM File Copy #2 MRP (2 of 3 binders)</p>	
<u>Box 46</u>	<p>CO-OP MINING COMPANY BEAR CANYON MINE ACT/015/025</p> <p>DOC TD Response DOGM File Copy #2 (black binder) (yellow) binder is Bear Canyon Portal - Modification of Interim Mine Plan Bear Canyon Permit Modification 5/7/83 Geology (Rec'd Nov. 26, 1982) Includes Plates and plans</p> <p>MRP Chapter 1, 2 and 3</p> <p>Co-Op Mining Submittal - Bear Canyon haul road portion designated private (3 copies rec'd 8/8/83)</p> <p>Topsoil Stockpile Consolidation - 3/18/85</p> <p>Co-Op Plans for Bear Canyon - NOV N83-5-5-3 Abatement</p> <p>Co-Op Plans for Bear Canyon - NOV N83-5-2-2</p> <p>Hydrology Report - NOV 83-5-2-2, part 2 of 2</p> <p>Modification Submittal - Answer to Deficiencies 5/27/83</p> <p>NOV 83-5-8-3 Abatement</p> <p>NOV N83-5-2-2 Abatement Action and/or Plans Submittal for Approval 6/7/83</p> <p>Modificaton Submittal 5/27/83</p> <p>Scale House Modification Add-On 8/8/83</p>	

ADDENDUM TO RECORDS TRANSFER

Please submit original to Utah State Archives and Records Service, Room 28, State Capitol Building

From (Agency)		Accession Number:
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Agency Box Number	Description and Date of Records in Each Box	Records Center Box Number
<u>Box 47</u>	<p>CO-OP MINING COMPANY BEAR CANYON MINE ACT/015/025</p> <p>DOGM File Copy #1 ACR Response Binder for Response to NOV's N83-5-5-3 #2 Hydrology Calculations N83-5-2-2 #2 and Map 8/25/83 N83-5-8-3 #3</p> <p>Map of Area - Undisturbed Hillside - 8/26/83 at side of road; Also, CFS requirement of the culvert passing under road</p> <p>Scalehouse Modification Plan for Upper Pad Area Addendum Topsoil Handling Plan NOV 83-5-7-1 (2 copies - 7/18/83)</p> <p>Upper Pad Modification Cross Sections ACR/TD Response Copy #3 and 1</p> <p>Apparent Completeness Review 7/29/83 Topsoil Stockpile Consolidation Vegetation Analysis (2 copies) Seed List</p> <p>Appendix 7B (red binder) Regional Aquifer and Ground Water Study Chapter 7 (updated 3/31/87) Hydrology (black binder) 7/20/85</p>	
<u>Box 48</u>	<p>(Various Mines and Paraphenalia)</p> <p>CO-OP MINING COMPANY BEAR CANYON MINE ACT/015/025</p> <p> MRP Section 7 - Hydrology</p> <p>WEST APPA COAL COMPANY-RILDA CANYON-PRO/015/010</p> <p>(1983) (banded in elastic) "Contract permitting bid proposals"</p> <p>KAISER COAL COMPANY-SUNNYSIDE MINE-ACT/007/007</p> <p>(1983) (elastic band) "Contract permitting bid proposals"</p> <p>CONSOLIDATION COAL COMPANY-EMERY DEEP MINE-ACT/015/015</p> <p>(1983) (elastic band) "Contract permit bid proposal"</p>	