

Proposal For:

Baseline Data Collection
& Analysis

Small Operator's Assistance Program

Summit Coal Company

Boyer Mine, PR0/043/008

Summit County, Utah

Requisition No. 587504

Prepared For:

STATE OF UTAH

DIVISION OF PURCHASING

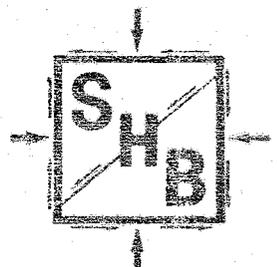
2112 State Office Building

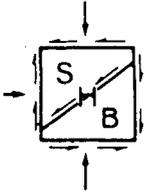
Salt Lake City, Utah 84114

SHB Proposal No. 85-4-5B

Consulting Geotechnical Engineers

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CONSULTING GEOTECHNICAL ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING • HYDROLOGY

B. DWAIN SERGENT, P.E.
LAWRENCE A. HANSEN, PH.D., P.E.
RALPH E. WEEKS, P.G.
DARRELL L. BUFFINGTON, P.E.
DONALD VAN BUSKIRK, P.G.

JOHN B. HAUSKINS, P.E.
DALE V. BEDENKOP, P.E.
DONALD L. CURRAN, P.E.
J. DAVID DEATHERAGE, P.E.

GEORGE H. BECKWITH, P.E.
ROBERT W. CROSSLEY, P.E.
DONALD G. METZGER, P.G.
JONATHAN A. CRYSTAL, P.E.

ROBERT D. BOOTH, P.E.
NORMAN H. WETZ, P.E.
ROBERT L. FREW
ALLON C. OWEN, JR., P.E.

April 27, 1985

State of Utah
Division of Purchasing
2112 State Office Building
Salt Lake City, Utah 84114

SHB Proposal No. 85-4-5B

Re: Small Operator's Assistance Program
Summit Coal Company
Boyer Mine, PRO/043/008
Summit County, Utah
Requisition No. 587504

RECEIVED

APR 30 1985

DIVISION OF OIL
GAS & MINING

Gentlemen,

Pursuant to your Request For Proposal (RFP), dated 4-3-85, we have prepared this proposal presenting our technical qualifications, proposed scope of work as well as estimated cost to perform the baseline data collection and analysis for the referenced project.

Prior to preparing this proposal, we have reviewed the RFP document as well as the Utah Division of Oil, Gas and Mining (UDOGM), Regulations Pertaining to Surface Effects of Underground Coal Mining Activities.

It is understood that following your review of submitted proposals, discussions may be held with offerors of potentially acceptable proposals. Sergent, Hauskins & Beckwith Engineers, (SHB) would be prepared to interview with, but not necessarily limited to, the following personnel: Mr. George H. Beckwith, P.E., Principal Engineer; Mr. Donald L. Curran, P.E., Managing Engineer, SHB, Utah; Mr. Allon C. Owen, P.E., Senior Hydrologist;

REPLY TO: 4030 S. 500 WEST, SUITE 90, SALT LAKE CITY, UTAH 84123

PHOENIX
(602) 272-6848

ALBUQUERQUE
(505) 884-0950

SANTA FE
(505) 471-7836

SALT LAKE CITY
(801) 266-0720

EL PASO
(915) 778-3369

Mr. Ralph E. Weeks, P.G., Senior Geologist; Mr. Bryan J. Bowser, Geologist.

In order to adequately address the scope of work required and our qualifications, our proposal has been categorized into the following appendices:

<u>APPENDIX</u>	<u>CONTENTS</u>
A	CORPORATE PROFILE PERSONNEL RESUMES
B	PROJECT EXPERIENCE
C	SCOPE OF WORK
D	COST ESTIMATE

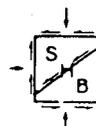
Should you have any questions concerning this proposal, we would appreciate the opportunity to review and clarify. We certainly appreciate the opportunity to prepare and submit this proposal as well as your consideration of our firm to provide the base line data collection and analysis required for this project.

Respectfully submitted,
Sergent, Hauskins & Beckwith

By *Donald L. Curran*
Donald L. Curran, P.E.

DLC/cc

Copies: Addressee (3)

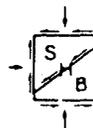


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APPENDIX A

Corporate Profile
Personnel Resumes



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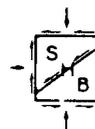
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CORPORATE PROFILESERGEANT, HAUSKINS & BECKWITH
GEOTECHNICAL ENGINEERS, INC.GENERAL

Sergent, Hauskins & Beckwith Engineers (SHB) provides a broad range of services in hydrological, geotechnical and materials engineering including: site investigations to develop criteria for the design of structural foundations, embankments, earth and rock slopes, earth retaining structures, tunnels, pavements and railroad track foundations; quality assurance of foundation, earthwork, pavement and concrete construction; siting and design of solid and liquid waste disposal facilities and water storage dams. Services also include engineering geophysics and soil dynamics studies, seismic hazard evaluations, computer modeling of surface and groundwater hydrology problems and the application of remote sensing to geotechnical and hydrological investigations.

SHB was incorporated in Phoenix, Arizona in 1959 with two full-time employees, Dwaine Sergent and Jack Hauskins. George Beckwith became the third full-time professional staff member in 1960.

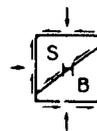
In 1981 SHB was ranked the 333rd largest design firm in the United States by Engineering News Record. The firm maintains well equipped offices and laboratories in Salt Lake City, Utah, Phoenix, Arizona, Albuquerque and Santa Fe, New Mexico, and El Paso, Texas.

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Firm Resources

SHB's Salt Lake City resources which are applicable to hydrological, geological, geotechnical and materials engineering as well as other related aspects of your project include the following:

- A. A staff of twelve people including two engineers, a geologist, hydrologists, drill crew, technicians and clerical personnel. The company has a total professional staff of 40, including 20 registered professional engineers, geologists, hydrologists and an engineering geophysicist with a total staff of approximately 160, including field and laboratory technicians, draftsmen, drill rig operators, clerical and administrative personnel.
- B. An in-house subsurface exploration group equipped with a CME-55, 4X4, truck-mounted drill rig with the capability of hollow stem auger drilling, diamond core drilling of rock, standard penetration testing, Shelby tube, Denison and Pitcher sampling of soils. The group is fully equipped to perform in-place permeability tests by open well, single packer and double packer methods, as well as steady-state pumping tests with multiple observation wells.
- C. A geophysical group capable of performing vibration monitoring, seismic refraction, reflection, downhole, uphole and crosshole surveys for the determination of compression and shear wave velocities, and resistivity and gravity surveys. SHB owns two Sprengnether 3-dimensional VS-1200 Seismographs with 4-channel, 2-speed recorders. These instruments are capable of recording ground and air vibrations simultaneously. Equipment also includes a Bison

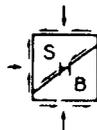


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Signal Enhancement Seismograph Model 1570B and a Geometrics 12-channel Signal Enhancement Recording Seismograph Model ES1210.

- D. A mobile unit for use in hydrogeological investigations with pumps, samplers, reels and water level measurement devices, etc., for the sampling of wells and test holes for water quality surveys in accordance with U.S. Geological Survey criteria and/or with other standards. The unit is equipped for the performance of field conductivity, pH, dissolved oxygen and temperature testing which are a part of the required sampling procedures.
- E. A soil mechanics and materials laboratory capable of performing a wide range of testing, including soil classification, consolidation, expansion, direct shear, unconfined compression, triaxial shear, aggregate quality, bearing ratio and R-value testing, asphaltic concrete, Portland Cement concrete, as well as cement, lime and other soil stabilization mix designs.
- F. In-house computer capabilities for geotechnical, hydrological and related applications. Computer hardware includes remote batch terminal access to other facilities. Ground water programs include the U.S. Geological Survey 2 and 3-dimensional finite difference and related programs for analysis of seepage, contaminant transport, ground water flow, effects of injection or pumping from wells, pit and mine dewatering, and similar programs. Surface hydrology programs include the latest additions of the U.S. Army Corps of Engineers HEC-1, HEC-2 and HEC-6 and the U.S. Soil Conservation Service TR-2 programs for analysis of runoff, reservoir flood routing, spillway capacity, dam breaks, sediment transport, as well as scour and deposition in rivers and reservoirs.

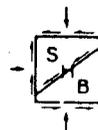


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- G. Access to a comprehensive technical library and information center (Phoenix SHB Office), managed by a full-time professional librarian, which we believe is the largest private facility of its type in the Southwest. Holdings include more than 500 volumes, over 2,500 technical reports, 66 domestic and international periodicals and journals, an extensive collection of U.S. and state Geological Survey publications, aerial photographs, satellite imagery, bibliographies, abstracts and maps. The information center conducts an ongoing search and review of governmental regulations and design criteria with particular emphasis on regulations relating to dams and solid and liquid waste disposal. Comprehensive research of a particular subject is rapidly achieved by computer searches with access to over 100 on-line bibliographic data bases, including GeoRef, ReCon and Engineering Index.
- H. A sophisticated word processing system to facilitate the production of our large and complex volume of engineering reports and related correspondence. The system consists of microcomputers with modems to communicate information and reports between SHB and other offices. We find it essential to maintain the above equipment and support personnel to provide efficient and reliable services to our clients.
- I. SHB's professional staff maintains active membership in the following professional and technical societies:

American Concrete Institute
American Consulting Engineers Council
American Geophysical Union
American Institute of Professional Geologists
American Society of Civil Engineers
American Society of Testing and Materials

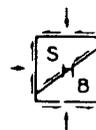


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Arizona Water and Pollution Control Association
Association of Engineering Geologists
Association of Asphalt Paving Technologists
Construction Specifications Institute
Deep Foundations Institute
Earthquake Engineering Research Institute
Geological Society of America
International Association of Engineering Geology
International Association of Hydrogeologists
International Commission on Large Dams
International Society for Rock Mechanics
International Society of Soil Mechanics
and Foundation Engineering
National Society of Professional Engineers
National Water Well Association
Seismological Society of America
Special Libraries Association
Structural Engineers Association of Arizona
Structural Engineers Association of Utah
Transportation Research Board
Utah Consulting Engineers Council
Utah Geological Association
Utah Society of Professional Engineers

SHB maintains principal engineer involvement in the direction and critical engineering analysis of all projects so that the full experience and expertise of the firm is utilized and our high professional and technical standards are maintained.



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George H. Beckwith, P.E.
Senior Vice President
Sergent, Hauskins & Beckwith Engineers

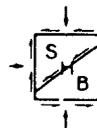
Mr. Beckwith earned his B.S. degree in Civil Engineering from Gonzaga University in 1957. He is a registered professional engineer in the states of Arizona, Nevada, New Mexico, California, Montana and Idaho.

Mr. Beckwith is a member of the American Society of Civil Engineers, the American Society for Testing and Materials, the International Society of Soil Mechanics and Foundation Engineering, the Earthquake Engineering Research Institute, U.S. Committee on Large Dams, the Seismological Society of America, the International Association of Engineering Geology and several other professional societies. He is past president of the Phoenix Branch and Arizona Section of ASCE.

Mr. Beckwith draws on 21 years of experience as a geotechnical consultant on projects in the southwestern United States and Rocky Mountain region. Many of these projects have involved the siting, design and construction of major waste disposal facilities for the mining and utility industries. Several of these projects are the Exxon Pinos Altos Copper/Zinc Project in Grant County, New Mexico, the Freeport Gold Company Jerrit Canyon Project in Elko County, Nevada, the Placer Amex Inc. Aurora Joint Venture Uranium Project in Malheur County, Oregon, the Utah International Inc. Springer Tungsten Project in Tungsten, Nevada, the Anaconda Company Hall Molybdenum Project in Nye County, Nevada, the Pennsylvania Power and Light Company Utah Uranium Project in San Juan County, Utah and the Placer Amex Inc. Golden Sunlight Project at Whitehall, Montana. Mr. Beckwith was also responsible for site selection and embankment systems for the Kaiparowits Generating Station in Utah, the Navajo, Cholla, Coronado and Springerville coal fueled generating stations in Arizona, and two sites of 2,000MW generating stations for the Public Service Company of New Mexico in northwestern New Mexico.

Mr. Beckwith has been responsible for foundation design studies for a wide variety of building projects ranging from residential and commercial developments to high-rise buildings. He has directed approximately 40 foundation investigations for mills and other mineral processing facilities.

Mr. Beckwith joined SHB in 1960 and became an associate in 1964 and a principal in 1967. He has served as project engineer for a diverse range of geotechnical investigations, including foundation design studies for buildings and bridges, corridor studies for highway, railroads, power transmission lines and



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George H. Beckwith, P.E. (Cont'd.)

pipelines, investigations and embankment design studies for water storage dams and tailings dams, and evaluations of highway and airport pavement structures and conventional railroad track foundations.

Prior to joining SHB, Mr. Beckwith worked for the U.S. Bureau of Public Roads and the Chicago, Milwaukee, St. Paul and Pacific Railroad Company on highway and railroad location, design and construction surveys in Montana, Idaho and Washington. From 1957 to 1959, he served as a commissioned officer in the U.S. Army Corps of Engineers and was involved with highway and airfield construction in Newfoundland, Labrador and West Germany.

Mr. Beckwith was principal investigator on a research project for the Arizona Highway Department in which design criteria were developed for high capacity, drilled, cast-in-place concrete piers bearing in stiff cemented desert soils. The project involved design of a special fully mobile load frame performing 27 load tests to loads of up to 1,000 tons and extensive on-site testing with pressuremeters and other in situ testing devices.

Publications & Presentations

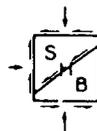
Beckwith, George H., 1982, "Bridge Foundations in the Salt River Valley, Arizona: Problems and Solutions", presented at the May 19-21, GEO-PILE Conference, held at San Francisco, California.

Beckwith, George H. and Hansen, Lawrence A., 1981, "The Calcareous Soils of the Southwestern United States", presented at the January 20, ASTM symposium on Performance and Behavior of Calcareous Soils, held at Fort Lauderdale, Florida.

Beckwith, George H., 1976, "Evaluation of Seismic Risk for Phoenix, Proposed Revisions of Phoenix Building Code", prepared by Sergeant, Hauskins & Beckwith, Phoenix, Arizona, May 25.

Beckwith, George H. and Bedenkop, Dale V., 1973, "An Investigation of the Load Carrying Capacity of Drilled Cast-in-Place Concrete Piles Bearing on Coarse Granular Soils and Cemented Alluvial Fan Deposits", report AHD-RD-10-122, Arizona Highway Department, Phoenix, Arizona, May.

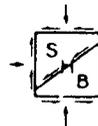
Crossley, Robert W. and Beckwith, George H., 1978, "Subgrade Elastic Modulus for Arizona Pavements" Final Report, FHWA/AZ-75/142, Arizona Department of Transportation, Phoenix Arizona, March.



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Srinivasan, Vas, Beckwith, George H., and Burke, Harris H.,
1977, "Geotechnical Investigations of Power Plant Wastes",
Proceedings of the Conference on Geotechnical Practice for
Disposal of Solid Waste Materials, American Society of Civil
Engineers, June pp. 169-187.



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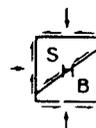
Donald L. Curran, P.E.
 Utah Manager/Project Manager
 Sergent, Hauskins & Beckwith Engineers

Donald L. Curran received his B.S. degree in Civil Engineering from the University of Illinois, Champaign-Urbana, Illinois in February, 1968. He is a registered professional engineer in Utah and five other states. He is a member of the National and Utah Society of Professional Engineers, Structural Engineering Association of Utah, and Utah Geological Association and Utah Consulting Engineering Council.

Prior to joining SHB, his experience included nine years of geotechnical engineering and materials quality control experience with A & H Engineering Corporation in Illinois, and one year of oil well logging experience with Schlumberger Well Service in Victoria, Texas.

His engineering experience includes 8 years as engineering office manager, 2 years as resident project engineer and 3 years as a staff engineer. His geotechnical engineering experience includes the planning, layout, supervision and analysis of soil borings for several hundred projects. Project types include parking lots, municipal streets, interstate highways, airport runways, residential homes, high-rise complexes, large industrial facilities, at grade and elevated storage tanks and silos, earth dams and embankments, mining facilities, and groundwater and dewatering systems. Experience includes the planning, performance, supervision, analysis and reporting of laboratory and field soil testing. These procedures include classification tests, moisture-density relationships, permeabilities, unconfined and triaxial tests, consolidation tests, bearing ratio tests, plate load tests, pile load tests, field drilling and sampling procedures for soils and rock. Engineering analysis and recommendations have been performed for spread footings, mat foundations, caissons (drilled pier), piles, slope stabilities and ground water conditions and dewatering systems.

His construction inspection experience includes the planning, supervision, performing, analysis and reporting of most phases of construction and includes foundations, soils, concrete, reinforcing steel, structural steel, roofing, bituminous concrete and post-tensioning. Material testing experience includes laboratory and field tests on most construction materials including aggregates, PCC concrete, bituminous concrete, soil cement, reinforcing steel, structural steel, high strength bolts, soils, roofing materials, concrete blocks, drainage tile and welding.



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Allon C. Owen, P.E.
Senior Hydrologist
Sergent, Hauskins & Beckwith Engineers

Mr. Owen received his B.S. degree in Civil Engineering from Brigham Young University in 1973. In 1978, he received his M.S. degree in Water Resource Development from the University of Utah. Mr. Owen is a registered professional engineer in the State of Utah.

Mr. Owen joined the firm in 1981 and since that time he has performed several hydrology related analyses for surface water studies. Prior to joining SHB, he was employed by Coastal States Energy Co. as a Senior Hydrologist from 1979 until 1981, by Rollins, Brown, and Gunnell as a hydrologist from 1978 until 1979, by Vaughn-Hansen Associates as a hydrologist from 1976 until 1978 and by the U.S. Corps of Engineers as a Civil Engineer from 1973 until 1976.

The following discussion presents the most significant projects on which Mr. Owen has performed hydrological and engineering studies:

Hydrologic & Water Quality Studies for Energy Development

1. Skyline Mine Project, Carbon County, Utah Coastal States Energy Company

Directed and performed ground water and surface water studies of mine properties. Permit application resulted in the issuance of the first mining permit by Office of Surface Mining in the United States. Work involved close coordination with all pertinent federal and state regulatory agencies to assure compliance with regulations. Many policies, procedures and precedences were established while pioneering the permit work to completion.

Conducted an extensive drilling and test program to determine ground water aquifer characteristics in conjunction with geologic exploration activities during project development.

Developed monitoring schemes for ground water and surface water hydrology and water quality to comply with federal and state regulations and NPDES discharge permits.

Developed underground water supplies for culinary and coal handling process requirements.

Allon C. Owen, P.E. (Con't.)

Performed engineering, construction supervision and permit work for conveyor belt benches, access roads, sediment ponds, water treatment plants, wastewater treatment plant, water supply system, water wells, topsoil storage areas, waste rock disposal areas and stream relocations to preserve hydraulic and aquatic habitat conditions of a pristine mountain stream.

2. Coal Fired Power Plants, Utah Power and Light Company

Prepared hydrologic impact assessment of Hunter Units 3 and 4 environmental report.

Evaluated ground water resources in the San Rafael River Basin and the lower Sevier River Basin for power plant usage.

Prepared the impact assessment of power plants within the San Rafael and Price River Basins on salinity of the Colorado River.

Conducted feasibility studies of various water resource development schemes for several power plant sites which included engineering and cost analysis of:

water conveyance systems (pipelines, canals, etc.)

reservoirs

X ground water development

multiple use and reuse of water for industrial and agricultural demands

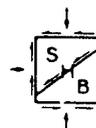
availability of water rights

3. Allen-Warner Power Project

Performed impact analysis of Allen-Warner Power Project on hydrology and sedimentology of the Virgin River.

Utilized computer model of hydrology and hydraulics of the stream for various power project demand schemes.

Coordinated study of aquatic biologists to evaluate impacts of project water demands on food and habitat of the woundfin minnow and Virgin River chub.



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Allon C. Owen, P.E. (Con't.)

4. Water Resource Development of Antelope Island for Anchutz Corporation.

X Evaluated surface and ground water resources of island.

Recommended water well sites and storage reservoir sites.

Conducted a geochemical study of ground water on the island and around the Great Salt Lake.

5. Henry Mountains Coal Field for BLM

Directed geologic study to evaluate coal reserves and coal quality.

Conducted field surveys of watersheds, channels and springs.

Developed possible coal development schemes on hydrology, water quality and sedimentology of the area.

Other Hydrologic and Water Quality Studies

1. Participated in EPA 208 water quality studies for three designated 208 areas in Utah.

2. Evaluated impacts of canal losses of 100 miles of canals near Roosevelt, Utah on salinity of Colorado River for USBR.

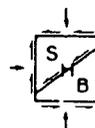
X Directed field work to measure canal losses using instream measuring methods and water quality.

Utilized aerial photograph to note geologic features important to canal losses.

Conducted soils and vegetation study of canals to correlate with seepage measurements.

Prepared recommendations of canal sections to be treated to inhibit canal seepage based on cost effective factors and technical feasibility.

Participated in study of impacts on water quality of Utah Lake resulting from diking Goshen Bay and Provo Bay.



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Allon C. Owen, P.E. (Con't.)

Utilized computer model of lake to predict water quality patterns resulting from diking.

Gathered field data for use in the model.

Conducted evaluation of groundwater inflow and outflow of the lake.

* Participated in the initial hydrological work for the Flood Insurance Study in Salt Lake County.

Geotechnical Engineering Projects

1. Preliminary design of 80 foot high earth dam for Price River Water Conservancy District.
2. Conducted field geotechnical studies of foundations, borrow material, slope stability analysis, internal drain materials and filters.
3. Conducted flood hydrology studies for various return periods including the probable maximum flood. Designed the spillway and outlet works according to hydraulic requirements.
4. Prepared plans and specifications for several sediment ponds for U.S. Fulls Mines at Hiawatha, Utah.
5. Evaluated hydraulic capacity of the Grassy Trail Reservoir to handle current design flood requirements for Kaiser Steel Company.
6. Supervised construction of 58 acre sewage lagoons at Fort Chaffee, Arkansas during Vietnamese refugee occupancy.

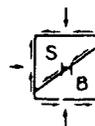
Recent Publications

"Salinity Changes in Colorado River from Development of Coal-Fired Power Plants in Emery County, Utah," a Vaughn Hansen Associates Report, June 1976.

"Impact of Canal Seepage in Uintah Basin on Salinity of the Colorado River," a Vaughn Hansen Associates Report, 1978.

"Impact of Allen-Warner Project on the Hydrology of the Virgin River," a Vaughn Hansen Associates Report, 1978.

"Hydrologic Reconnaissance and Environmental Assessment of Henry Mountains Coal Field, Utah," a UINTEX Tech Report, in progress.



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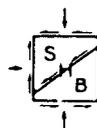
Ralph E. Weeks, P.G.
 Senior Geologist
 Sergent, Hauskins & Beckwith Engineers

Mr. Weeks received his B.S. degree in Geology from Northern Arizona University in 1969, followed by one year of advanced studies in law and geology at Arizona State University during 1970. He has supplemented his professional experience in the past four years by attending several academic short courses in the field of ground water hydrology and pollutant movement. Mr. Weeks is a registered geologist in the States of Arizona and Indiana and a certified member and current vice president of the Arizona section of the American Institute of Professional Geologists. He is also a certified water well driller in Arizona and a member of the Geological Society of America, the Association of Engineering Geologists, the National Water Well Association, and the American Geophysical Union.

As staff and senior geologist with SHB from 1969 to 1972 and since 1976, Mr. Weeks has acquired experience in project management, geological data acquisition and report preparation for multiple geotechnical and hydrogeological projects. Various responsibilities have included full supervision of field investigations, development of testing programs, budget and proposal preparation, liaison activities with consulting hydrologists and mining organizations, and research of geological and hydrogeological literature and data. Field functions have included the specialized mapping of lithology, fracture patterns and landslide features, the design of field permeability test programs and ground water monitoring systems, and the logging and sampling of soil/rock formations by multiple borehole methods. Mr. Weeks is also experienced in the use of geophysical methods, shallow seismic refraction and resistivity surveys, and active fault studies with special reference to their application in site selection evaluations.

During his association with SHB, Mr. Weeks has had the opportunity to be involved in projects in Arizona, New Mexico, Nevada, Utah, Oregon, Montana, Wyoming, and Canada. These projects include site selection studies for millsite and tailings disposal facilities, seismic hazard studies, hydrogeological investigations of landslide hazards, railroad alignments, damsites, power and pipeline transmission systems, and industrial buildings. The following list enumerates several of these projects.

Geotechnical, earthquake evaluation
 and hydrogeologic site selection studies
 for uranium milling facilities



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Ralph E. Weeks, P.G. (Con't.)

Aurora Joint Venture - Placer Amex Inc.
Malheur County, Oregon

Manager and technical participant - geotechnical exploration and analysis, active fault studies involving low-sun-angle photography and analysis, trenching of fault zones and hydrologic testing.

Geohydrological Investigation
K-2 Potash Project
International Mineral Corp.
Esterhazy, Saskatchewan

Manager - Study of the brine contamination of groundwater caused by disposal of potash process wastes in 400 acre surface facility. Study included detailed hydrogeologic data compilation and computer modeling to predict future impacts and recommend remedial measures.

Geotechnical Evaluations
Baca Geothermal Project
Bechtel Constructors
Valles Caldera, New Mexico

Manager - Study of existing cyanide contamination of ground water system. Investigation included installation of multiple monitoring wells, hydrological testing and 3-dimensional ground water modeling to predict future impacts.

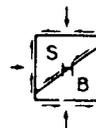
Geotechnical and earthquake evaluation studies
Jerrit Canyon Project - Freeport Gold Company
Elko County, Nevada

Assistant manager and technical participant - geotechnical exploration and analysis, and active fault studies involving regional evaluation, low-sun-angle reconnaissance and photography, and photogeologic analysis for siting and design of 17 million ton tailings disposal facility.

Earthquake evaluation studies
Espanola Basin Flood Control Dams
U.S. Soil Conservation Service
Rio Grande Rift, New Mexico

Manager and technical participant - regional and site low-sun-angle photo acquisition, photogeologic analysis, trenching program and evaluation of surface rupture potential and design earthquake parameters.

Geotechnical design development studies
Schoens Flood Control Dam
Navajo County, Arizona



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Ralph E. Weeks, P.G. Con't.

Project geologist assessment of 33,000 acre-foot capacity flood control structure. Studies included remote sensing imagery analysis and detailed dam foundation mapping.

Preliminary geotechnical and earthquake potential studies

Gold Quarry Project - Newmont Mining Corp.
Eureka County, Nevada

Manager - geologic field investigation and technical participant in preliminary evaluation of earthquake hazard, ground water contamination potential and embankment design of 18 million ton tailings disposal facility.

Geohydrological studies for submission of discharge plan
Copper Flats Project

Quintana Minerals
Sierra County, New Mexico

Manager - hydrological evaluation to determine potential water quality effects of future disposal of 20 million tons of copper tailings. Study included monitoring well installation, hydrological testing and baseline water quality determinations.

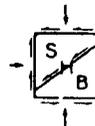
Subsidence and earth fissuring evaluation
McMicken Flood Control Dam
Maricopa County, Arizona

Project geologist - analysis of existing ground subsidence and fissuring due to ground water withdrawal. Studies included acquisition and review of low-sun-angle serial photography and development of remedial measures to restore 9-mile long dam to service.

During previous work for H. Coiner and Associates in Salmon, Idaho and L. H. Bell and Associates in Phoenix, Arizona, Mr. Weeks acquired three years of experience as a civil engineer designer and survey party chief. Responsibilities included design, field layout and construction control for urban subdivisions, municipal utilities, roads and flood control facilities. Design phases of his work included engineering computer applications and project administration.

Publication

Hansen, L.A., Weeks, R.E. & Shrestha, R.K., 1983, "Evaluation of On-Site Soil for Use as an Impoundment Liner", Hazardous & Industrial Solid Waste Testing: Second Symposium, ASTM STP 805, R.A. Conway & W.F. Cullledge, Eds., American Society for Testing and Materials, p. 231-245.



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Bryan J. Bowser
Project Geologist
Sergent, Hauskins & Beckwith Engineers

EDUCATION:

B.S., Geology, Brigham Young University, 1978

Special Studies:

Research Assistant, Geotechnical Engineering Dept.,
University of Illinois

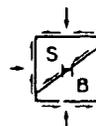
Hazardous Waste Site Investigation Training and Remedial
Planning, Zone II, "REM/FIT" Program. Program sponsored by
CH2M-Hill, Ecology and Environment, Inc., and the EPA
Office of Emergency and Remedial Response.

EXPERIENCE:

Mr. Bowser is a geologist with diverse expertise and experi-
ence in both hydrologic and geologic engineering and has
recently been assigned as staff geologist for SHB's Utah
operations. His previous experience includes the testing
and evaluation of proposed cover soils for use at uranium
mill tailings and low-level radioactive waste disposal
sites; the design and installation of field experiments to
verify laboratory test results for potential cover mate-
rials at hazardous waste disposal sites; and the perfor-
mance and supervision of laboratory testing studies on the
proposed cover soil including particle size analysis,
specific gravity, description and classifications of soils
as well as multi-element analysis by X-ray fluorescence.

Geologically, Mr. Bowser has evaluated mineral resources
for strategic and economic minerals throughout Nevada.
This included large and small scale mapping, stream
sediment sampling, rock chip and soil sampling, claim
staking, reverse circulation drilling, and core drilling.
Mapping was done in Paleozoic sedimentary, Mesozoic
plutonic, and Tertiary volcanic and sedimentary rocks. He
also supervised the Cimarron Drill Project near Tonopah,
Nevada. Mr. Bowser has recently characterized the geology
of the Twin Cities Army Ammunition Plant at New Brighton,
Minnesota, for an environmental assessment statement.

Specific project experience includes ground water moni-
toring well installation and soil and water sampling on
properties adjacent to the United Nuclear Uranium Mill at
Churchrock, New Mexico, a CH2M-Hill, EPA Superfund Project;
and waste removal planning, radiation surveys, subsurface
sample collection and analysis for the Standard Oil Company
remedial action radioactive waste removal project at Texas
City, Texas.

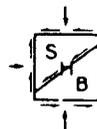


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Bryant J. Bowser, P.G., (Con't.)

In addition, Mr. Bowser has participated in geotechnical investigations for numerous projects including borrow source investigations and characterization of deposits as to ground water features on Antelope Island in the Great Salt Lake for the Saltair Highway Project, near Salt Lake City, Utah; an investigation to determine anticipated construction conditions for the Little Blue Intercepting Sewer Project near Kansas City, Missouri; evaluation of the Current Creek Pipeline at the Central Utah Water Project; and the evaluation of dam foundations and abutment conditions as well as construction methods to control seepage at the Long Park Dam Project in Utah.

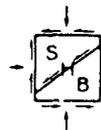


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APPENDIX B

Project Experience



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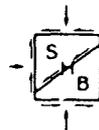
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PROJECT EXPERIENCE

SHB's practice has been concentrated in the western United States and northern Mexico. We have performed over 7,500 geological, hydrological and geotechnical engineering investigations and have provided quality control testing and inspection on more than 4,000 construction projects throughout this region. The types of projects for which our services may be required range from residential development through commercial construction to heavy industrial projects, including mining and power projects.

The following projects typify SHB's Salt Lake City experience in hydrogeological and geological engineering.

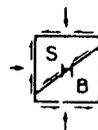
<u>Project</u>	<u>Scope of Work</u>
* Kaiser Steel Corp. "B" Canyon Permit Sunnyside Ut.	Geologic and hydrologic investigations for sections in Mine permit application.
Kennecott Utah Modernization Project Salt Lake County, Ut.	Geological and hydrological study of east slopes of Oquirrh Mountains between Bingham Mine and Magna Concentrator.
* Coastal State Energy Company Skyline Mine Carbon County, Utah	Ground water and surface water studies for mine permit application.
* Henry Mountains Coal Field Bureau of Land Management	Geologic and hydrologic studies for coal development schemes.
Allen-Warner Power Project Virgin River	Performed impact study of power plant on hydrology and sedimentology of river system.



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Project	Scope of Work
Anschutz Corp. Antelope Island	Surface and ground water study of of islands water resources.
* Consolidation Coal Co. Emery Mine Emery County, Ut.	Geotechnical, geological and hydro- logical investigation for open pit coal mine operations.
UMTRA-Vitro Site Salt Lake County, Ut.	Installation of ground water monitoring system to include observation wells, pumping tests and obtaining ground water samples for chemical testing for baseline data and computer modeling of the groundwater system of the site.
UMTRA-Clive Site Tooele County, Ut.	Installation of ground water monitoring system, sampling of ground water and computer modeling of the groundwater system of the site.
Southern Utah Fuel Co. Mine No. 1 Sevier County, Ut.	Hydrological investigation and recommendations for final reclamation design.
* } Southern Utah Fuel Co. Mine No. 1 Sevier County, Utah	Geotechnical and hydrological investigation for design of waste disposal area.
Sage Point/Dugout Canyon Coal Mine Project Carbon County, Ut.	Geotechnical, geological and hydro- logical investigation for design of diversion system for ground water around portal facilities of mine.
* Southern Utah Fuel Co. Link Canyon Sevier County, Ut.	Hydrologic investigation and design of surface water diversion system.
Utah Power & Light Co. Hunter Units 3 and 4	Hydrologic impact assessment of power plants to include evaluation of ground water resources and develop water resource schemes.
EPA 208 Studies in Utah.	Water quality studies for 3 designated areas in Utah.

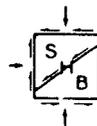


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APPENDIX C

Scope of Work



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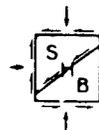
SCOPE OF WORK1.0 Project Objective

The objective of the proposed scope of work would be to provide a determination of probable impacts of the proposed mining and reclamation plans on the hydrologic regime of the area. The work will also establish baseline conditions as a reference point to monitor actual impacts.

2.0 Project Description

It is understood that Summit Coal Company's proposed deep mining operation is situated on approximately 170 acres in Section 25, Township 3 North, Range 6 East and is located about 1 mile east of Upton, Utah, on County Highway 133 as shown on Figure 1, Index Map.

In addition, there have been regional hydrology and geology studies performed that generally characterize the hydrologic regime in the area. Four exploration boreholes were cored in 1982, but little water was yielded from the holes. These holes were grouted closed at completion and are not available as ground water monitoring points. About 1 mile north of the permit area, an exploration/culinary well was drilled to a depth of about 900 feet. Artesian pressures were encountered that produced significant flows at the well

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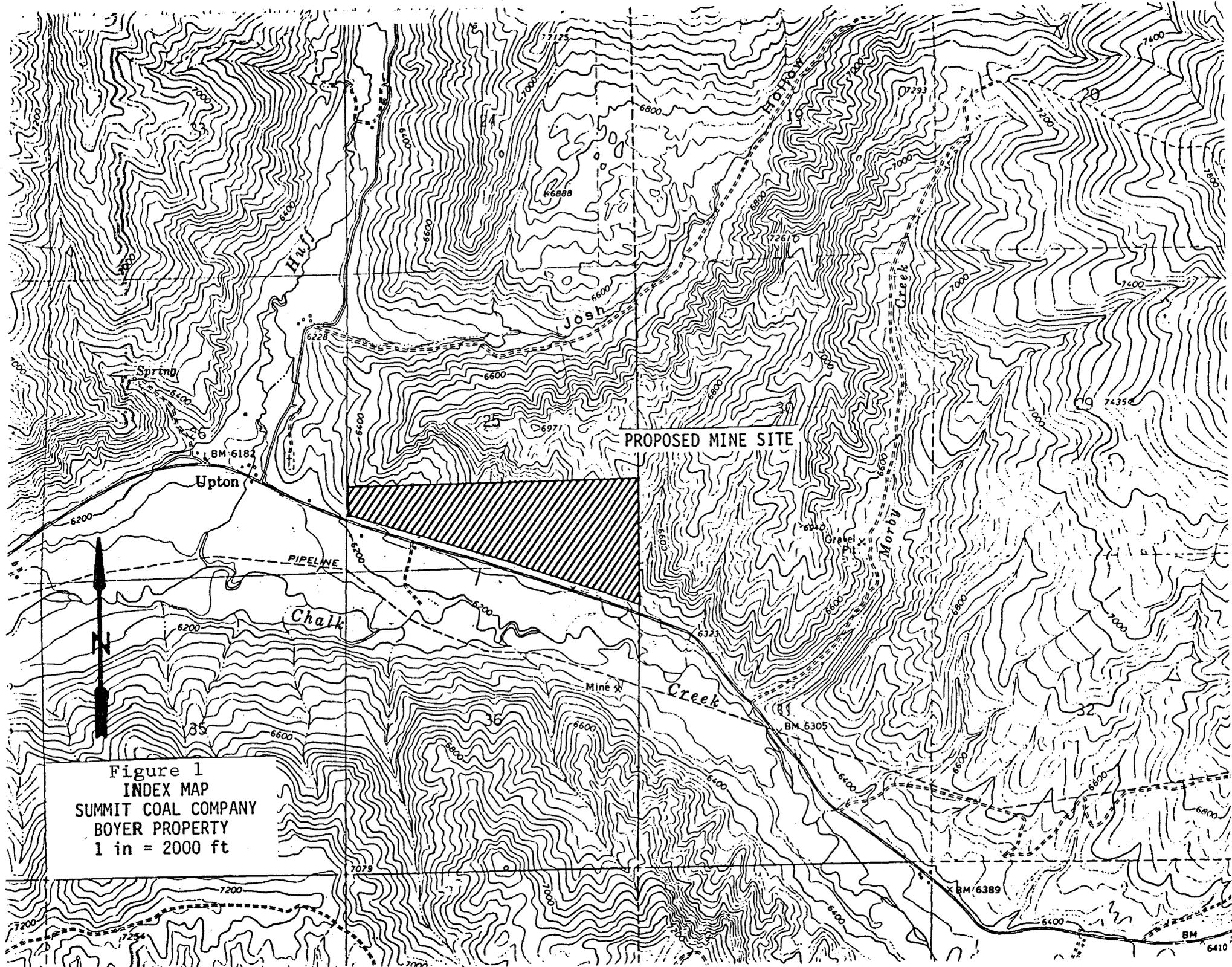


Figure 1
INDEX MAP
SUMMIT COAL COMPANY
BOYER PROPERTY
1 in = 2000 ft

collar. This is a potential ground water monitoring point. One major spring source has been located about 11 miles northwest of the permit property. The major surface water body in the area is Chalk Creek, a perennial stream whose annual flows typically range from 10 to 500 cubic feet per second. An irrigation canal is diverted out of Chalk Creek and flows parallel to the creek near the mine site. An intermittent drainage bisects the disturbed area of the mine property. Base flow and snowmelt contribute discharge to this tributary three to four months annually. In addition, several ephemeral drainages drain into the property.

Cores from the exploration holes are available for analysis from the mine operator through UDOGM.

3.0 Scope of Work

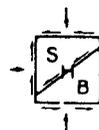
The following sections summarize the proposed scope of work which will be performed in accomplishing project objectives. The following task descriptions are divided into three areas; Surface Water, Ground Water and Overburden, Coal Strata and Underburden information.

3.1 Surface Water Baseline Information

3.1.1 Introduction

The proposed surface water hydrology study will meet several general objectives, including:

- o Review of existing hydrologic data and assessment of data deficiencies.



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- o Provide baseline characterization data (within data limitations) as a basis for addressing potential (surface water) hydrology impacts which may result from the proposed operations.
- o Prepare a cross section and longitudinal profile of the stream channel impacted by the mining operation. Other hydrologic information will be developed as necessary (with existing data limitations).

Several sub-objectives are contained within the second general objective of baseline characterization, including: (1) physical characterization of on-site watersheds, (2) estimated rainfall/runoff relationships (3) assessment of potential flood runoff, (4) characterization of surface water quality, and (5) estimation of soil loss from selected potential disturbance areas.

3.1.2 Assumptions

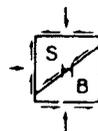
In designing the proposed surface water program, SHB has made the following assumptions:

- o The proposed hydrology studies will focus on the permit areas and a 1.0 mile radius.
- o The stream(s) will contain sufficient flow to allow water quality sampling at the required intervals during the contract period.
- o Access will be provided by the operator for the permit area and there is no restricted access to the surrounding.

3.1.3 Task Description

Task I - Literature Review

SHB will obtain and review information available from UDOGM and the mine operator relating to the surface



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hydrology and water quality for the project site and surrounding region. Additional sources of hydrologic data are the USGS, BLM, and SCS.

Regional climatological data (including precipitation records) should be available from the NOAA National Climatic Center. Local precipitation data should be available from National Weather Service stations in the general area.

SHB will review and evaluate the available hydrologic information and water rights for the project area. Gaps or inadequacies in the existing data base will be identified.

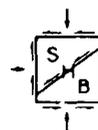
Task II - Watershed Characterization

Using available topographic base maps obtained from the mine operator, UDOGM or other sources, SHB will delineate the individual drainage basins, streams, and major drainages potentially affected by the proposed operations.

These maps along with field studies will be used for the determination of drainage basin characteristics including watershed area, existing reservoirs, lakes and impoundments, elevation, runoff coefficient, basin and channel slopes, channel roughness, soils, vegetation and land use.

Task III - Surface Water Monitoring, Sampling and Analysis

Samples will be collected from Chalk Creek and the intermittent and ephemeral channels within the study



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area during the contract period. Sampling schedules will be in accordance with criteria presented in the RFP. The field and laboratory parameters presented in Table 1 will be performed on samples collected. The data will be used to evaluate surface water quality and should serve as a basis for future comparisons.

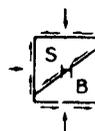
Task IV - Peak Flow Estimation

SHB proposes to evaluate the physical characteristics and runoff coefficients of the study area watersheds using available topographic maps of the project area. These data, in conjunction with soils, vegetation, and other available information, will then be used to estimate peak flows for selected basins using the SCS hydrograph method, regionalization, or other techniques. Peak flow will be estimated for the 10 year and 100 year events.

BE CAREFUL

In addition, a detailed description of Chalk Creek and the intermittent channel within the study area shall be provided. This description shall include: stream gradient profiles; description of stream bed materials, bank materials and riparian vegetation; calculations of 10 year and 100 year return period flows; three cross-sectional diagrams for each channel showing stream configurations for the 10 year and 100 year events.

GOOD



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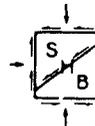
TABLE 1
SURFACE WATER BASELINE WATER QUALITY PARAMETERS

Field Measurements:

Flow
 Dissolved Oxygen (ppm)
 pH
 Specific Conductivity (umhos/cm)
 Temperature (C')

Laboratory Measurements: (mg/l)

Settleable Solids
 Total Suspended Solids
 Total Dissolved Solids
 Total Hardness (as CaCO₃)
 Aluminum (Al)
 Arsenic (As)
 Barium (Ba)
 Boron (B)
 Carbonate (CO₃⁻²)
 Bicarbonate (HCO₃⁻)
 Cadmium (Cd)
 Calcium (Ca)
 Chloride (Cl⁻)
 Chromium (Cr)
 Copper (Cu)
 Fluoride (F⁻)
 Dissolved Iron (Fe)
 Lead (Pb)
 Magnesium (Mg)
 Manganese (Mn)
 Mercury (Hg)
 Molybdenum (Mo)
 Nickel (Ni)
 Nitrogen: Ammonia (NH₃)
 Nitrate (NO₃⁻)
 Nitrite (NO₂)
 Potassium (K)
 Phosphate (PO₄⁻³)
 Selenium (Se)
 Sodium (Na)
 Sulfate (SO₄⁻²)
 Sulfide (S⁻)
 Zinc (Zn)
 Oil and Grease
 Cation-Anion Balance



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Task V - Soil Loss Determination

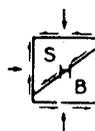
Utilizing information made available by the operator and UDOGM regarding location, type and extent of the various surface disturbances that will take place on site, SHB will estimate gross soil loss using the Universal Soil Loss Equation (USLE). These estimates will be made for the major disturbed areas such as the proposed processing facilities or other selected areas. Soils data derived from the published regional soil survey reports will be used to estimate gross soil loss from these areas.

Data required for estimating the sediment yield are soil type, land cover, rainfall intensity, watershed slope, length, and dimensions of disturbed area. Estimates of soil loss and sediment yield will be compared with suspended sediment concentrations obtained from proposed water quality sampling.

Task VI - Instrumentation

SHB will construct and maintain instrumentation necessary to collect sufficient baseline surface water data for one year. A continuously recording precipitation and temperature station will be installed on-site. Continuous recording stream gauge stations will be installed at proposed locations on Chalk Creek. Crest stage gauges will be installed on the intermittent and ephemeral channels at the proposed locations. Figure 2, Instrumentation Location Plan, shows preliminary locations for all surface and ground watering monitoring locations. All instrument locations and equipment will be reviewed with and approved by UDOGM prior to installation.

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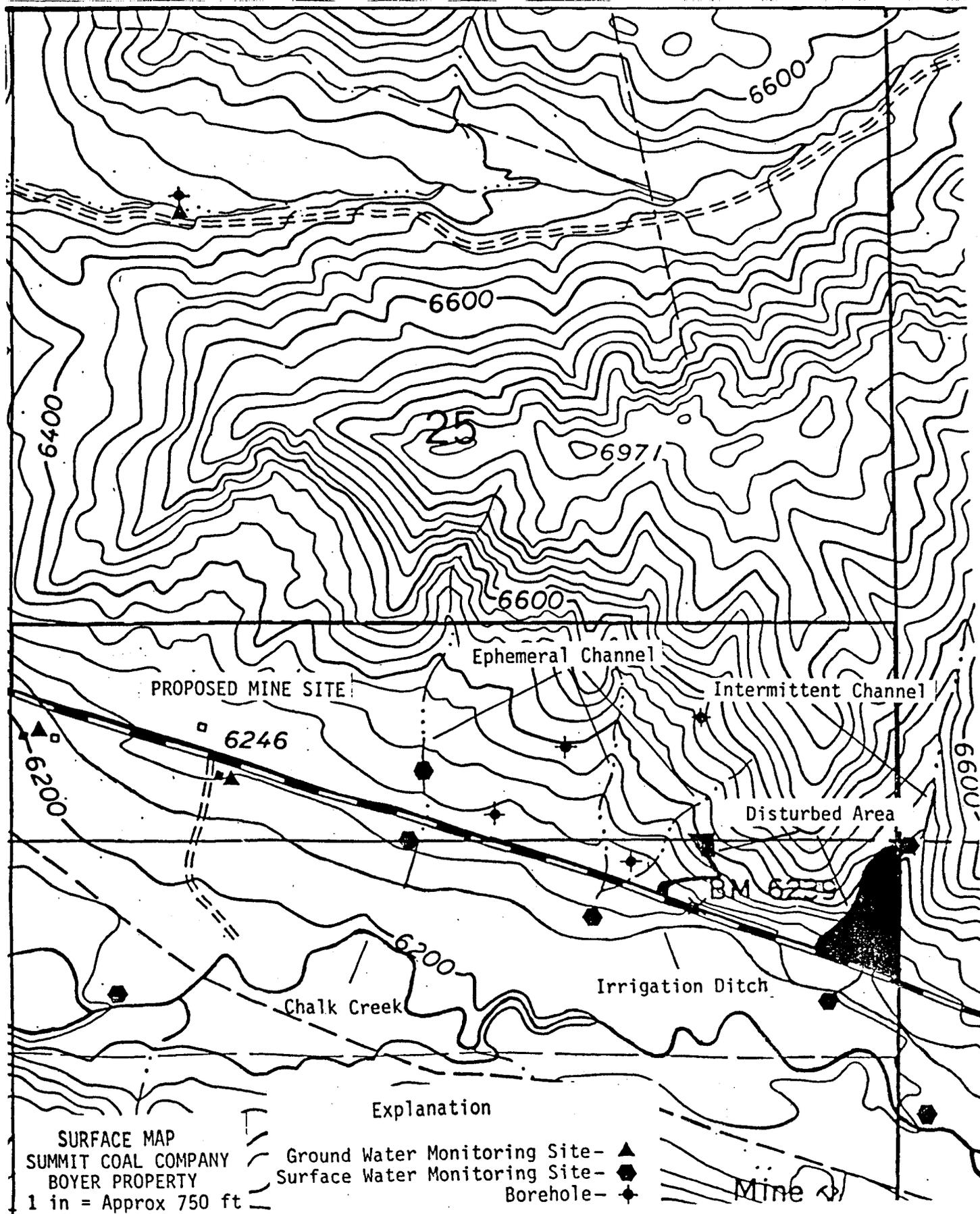


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FIGURE 2

INSTRUMENTATION
LOCATION PLAN



Task VII - Analysis and Reporting

The combined results of the aforementioned tasks will be evaluated and summarized in narrative form compatible with regulatory agency requirements. The proposed narrative will include:

- o Summaries of monitoring program results.
- o Watershed characteristics.
- o Peak flow assessments.
- o Surface water quality.
- o Soil loss data.

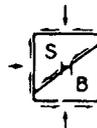
This baseline information will be supplemented as necessary by tabular data summaries, maps and figures as requested in the RFP. Emphasis will be placed on characterizing the baseline surface water conditions as a means of evaluating the potential effects of the mining operation.

3.2 Ground Water Baseline Information

3.2.1 Introduction

The proposed ground water hydrology and water quality investigation is designed to yield data on the physical and chemical hydrologic regime of the site.

UDOGM regulations require a description of the ground water hydrology of the proposed permit area and adjacent area. The description should include the depth, horizontal extent, lithology and thickness of any aquifers present, and known uses of the water and



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its quality. Additional information regarding the recharge, discharge and storage should also be provided.

Specific objectives of the ground water program are as follows:

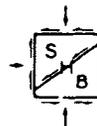
- o Describe (within data limitations) the existing physical hydrology of the mine site, including the hydrostratigraphic units which may be affected by mining operations, ground water flow rates and direction, configuration of the water table and/or potentiometric surfaces, and areas of recharge and discharge of ground water.
- o Define the chemical quality of ground water in potentially affected aquifers.
- o A review of pertinent published literature and data to establish a data base for the investigation and identification of data deficiencies.
- o A hydrologic inventory to locate and describe existing wells, springs and seeps within a 1 mile radius of the permit area.
- o Evaluation of regional ground water impacts on mining.

(T, S, Y?)

The objectives of the ground water investigation are designed to conform to the requirements of UDOGM.

3.2.2 Assumptions

- o Access will be provided by the operator for the mine site and there is no restricted access to the surrounding areas or wells.
- o Weather will permit timely collection of field data.
- o All pertinent subsurface exploration and/or hydrogeologic data will be provided by the operator and/or UDOGM in a timely fashion.



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3.2.3 Task Description

Task I - Literature Review

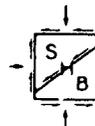
As an initial step in the hydrogeologic study of the mine site, SHB will review published reports, data and information pertinent to the project area. Resources will include the USGS, the State Engineer's Office, Utah Geological and Mineral Survey, our computerized bibliographic data base, and any additional reports or information that UDOGM and/or the operator can furnish. These activities will be performed concurrently with geologic data collection efforts.

Task II - Hydrologic Inventory

SHB will inventory and describe all existing wells and springs, along with location, elevation, well depth, and aquifer source, within the permit area and a 1 mile radius.

SHB proposes to conduct a hydrologic inventory which will provide the requested information within the study area boundaries and the adjacent area. The facilities and records of the Water Resource Division of the State Engineer's Office will be utilized, along with an examination of available air photographs and field reconnaissance in the spring and fall seasons. All locatable wells and springs will be marked on a USGS 7-1/2 minute (1":2000') topographic map, or a more recent topographic map, if available. Data concerning well construction, yield, field chemistry and, if possible, water levels will be measured or

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approximated. Each spring located will be marked with a permanent marker and its discharge measured if possible.

Task III - Ground water Monitoring, Sampling & Analysis

SHB will sample existing ground water monitoring sites and springs, if possible. Field and laboratory parameters for water quality are presented in Table 2. Ground water levels will be measured monthly as weather and snow cover permits. Water quality samples will be collected quarterly for a one year period.

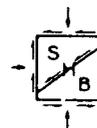
It is understood that it may be necessary to drill one additional ground water monitoring hole in the west portion of the permit area in order to better characterize site-specific conditions. For estimating purposes, the well will be 500 feet deep and be completed with 5 inch diameter, slotted, PVC casing. A suitable pump will be permanently installed for aquifer testing.

Task IV - Regional Impacts

Based on information collected in the literature search and the hydrology study, SHB will qualitatively address regional impacts due to mine development in a general narrative fashion.

Task V - Data Analysis and Reporting

The data and information collected in the tasks described above will be analyzed and used to produce a



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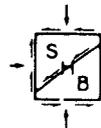
TABLE 2
GROUND WATER BASELINE WATER QUALITY PARAMETERS

Field Measurements:

Water Levels
 pH
 Specific Conductivity (umhos/cm)
 Temperature (C')

Laboratory Measurements: (mg/l)

Total Dissolved Solids
 Total Hardness (as CaCO₃)
 Aluminum (Al)
 Arsenic (As)
 Barium (Ba)
 Boron (B)
 Carbonate (CO₃⁻²)
 Bicarbonate (HCO₃⁻)
 Cadmium (Cd)
 Calcium (Ca)
 Chloride (Cl⁻)
 Chromium (Cr)
 Copper (Cu)
 Fluoride (F⁻)
 Dissolved Iron (Fe)
 Lead (Pb)
 Magnesium (Mg)
 Manganese (Mn)
 Mercury (Hg)
 Molybdenum (Mo)
 Nickel (Ni)
 Nitrogen: Ammonia (NH₃)
 Nitrate (NO₃⁻)
 Nitrite (NO₂)
 Potassium (K)
 Phosphate (PO₄⁻³)
 Selenium (Se)
 Sodium (Na)
 Sulfate (SO₄⁻²)
 Sulfide (S⁻)
 Zinc (Zn)
 Cation-Anion Balance



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report on the hydrologic regime of the mine permit area. The report will be designed to satisfy the requirements of UDOGM and will be in a format compatible with UDOGM guidelines.

The report will include:

- o Descriptions of the wells and springs located in the Hydrologic Inventory, along with the appropriate maps.
- o A description of the hydrologic parameters of the strata identified.
- o A narrative analysis of the ground water quality data collected and presentation of this data in tabular and/or graphic form.
- o A narrative summary of the hydrogeology of the mine site and surrounding area.

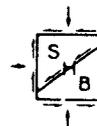
3.3 Overburden, Coal Strata and Underburden Information

3.3.1 Introduction

SHB proposes to conduct the geologic investigations, as outlined in the RFP. The tasks outlined in this scope of work should provide the data necessary to meet the UDOGM requirements.

The objectives of this investigation are to:

- o Review existing geologic data for the site and region.
- o Describe regional and site specific geologic conditions.
- o Describe the overburden, coal strata, and underburden lithologies at the mine site.



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- o Identify the chemical properties of the overburden, coal strata, and underburden and determine if additional analytical data are required.
- o Prepare a final report summarizing the above data.

3.3.2 Assumptions

In preparing this scope of work, SHB has made the following assumptions:

- o Access to the site and surrounding areas will be readily available to SHB personnel.
- o UDOGM personnel familiar with the project will be available to discuss various aspects of the project with SHB personnel.
- o Weather will permit timely completion of those tasks requiring field activities.
- o Core materials have been obtained for the holes performed by the mine operator and are adequate for use by SHB.

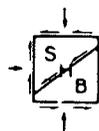
3.3.3 Task Description

Task I - Literature Review

SHB will conduct a search of the available literature at the libraries of the USGS, UGMS and UDOGM. Additionally, county and local agencies will be utilized if appropriate. This data will supplement any information provided by the mine operator.

Task II - Geologic Characterization

The geologic characterization will be conducted in compliance with UDOGM requirements for a coal mining



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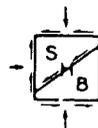
permit application. SHB will use the data obtained during the operator's exploration program to the fullest extent possible.

SHB's geologists will compile a surficial geologic map based on the results of available air-photographic interpretation and limited field reconnaissance. The map will identify to the extent possible surficial geologic units and bedrock structure within the site at a scale of 1":2000' (unless otherwise specified by the UDOGM).

SHB anticipates constructing two cross sections through the overall mine permit area, one perpendicular to the strike and one perpendicular to the dip of the major coal seams identified. The cross sections should, if possible, include potential aquifers above and below the coal seam to be mined. The scale of the cross sections will be determined once it is known how much data is available. The exploration holes drilled by the mine operator in the permit area will be used to develop the cross sections.

Task III - Chemical and Physical Analysis

SHB will perform analyses for overburden, coal strata and underburden samples in order to determine potential acid or toxic forming sections as well as the physical aspects of the materials. Analysis parameters are presented in Table 3.

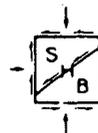


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TABLE 3
OVERBURDEN ANALYSES PARAMETERS

<u>Parameter</u>	<u>Reported As</u>
pH	Hydrogen ion activity
Conductivity	mmhos/cm at 25°C
Saturation	Percent
Particle Size Analysis	Percent clay, silt, sand and very fine sand
Texture	USDA textural class
Soluble Ca, Mg and Na	meq/l
Sodium absorption ratio	SAR calculated from soluble, Ca, Mg and Na concentrations
Carbonates	Percent
Selenium	ppm to a lower detection limit of .01
Boron	ppm
Nitrate-Nitrogen	ppm
Molybdenum	ppm to a lower detection limit of 0.1
Mercury	ppm
Acid Potential	meq H/100g or percent sulfur
Neutralization Potential	percent CaCO ₃ or tons CaCO ₃ /1,000 tons material
Acid-base Potential	tons CaCO ₃ /1,000 tons material
Arsenic	ppm



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Task IV - Reporting

Using the aforementioned information, SHB will develop a baseline geologic report that provides a narrative description of:

- o Regional and site geology.
- o Site stratigraphy and structure.
- o Coal resources.
- o Additional data requirements.

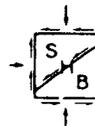
Supporting maps, graphics and tables will be used to supplement the narrative descriptions, including:

- o Site geologic map (1":2000').
- o Two site geologic cross sections. *
- o Other maps, graphics and tables as appropriate.

4. Reports

It is understood that SHB must submit a monthly narrative summary to the UDOGM Lead Reviewer. The summary must include an updated report of work tasks accomplished, copies of technical results, a compendium of field data collected, a summary of certified laboratory results, identification of any problems encountered at the mine permit area and an estimate of cumulative expenditures by SHB to date. The report is to be furnished to the UDOGM Lead Reviewer by the 15th of the following month.

Significant findings that would affect the development of the Summit Coal Company mine plan should be reported as soon as possible.



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A draft report compiled in the format designated in Section II, "Task Description" (any order is acceptable) of the RFP must be submitted to the UDOGM Lead Reviewer within 240 days of receipt from the effective date the of contract. Results and conclusions do not have to be submitted at this time as data collection may not be complete enough to make adequate conclusions.

The UDOGM will review the document for technical and physical deficiencies and return the report to SHB within thirty (30) days accompanied by a detailed critique of inadequacies. SHB then has thirty (30) days to address and correct the inadequacies and return the draft report to the UDOGM.

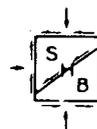
SHB shall submit a complete draft report by the 365th day from the effective date of the contract; the UDOGM shall review the report and return the document to SHB within a thirty (30) day period. A final copy of the report must be submitted by SHB to UDOGM by day 415.

Upon approval of the final report by the UDOGM, SHB must submit eight (8) copies of the report before the contract is terminated.

5. Subcontractors

During the performance of the baseline data collection and analysis, it is anticipated that two subcontractors will be utilized by SHB for the project.

SHB will utilize the University of Utah Research Laboratory, Earth Science Laboratory in Salt Lake City to perform all chemical analyses required for surface

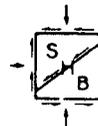


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water, ground water, overburden and underburden materials and coal strata. This laboratory is an EPA certified facility.

If a ground water monitoring well is to be installed as part of the study, SHB will utilize Land Exploration of Salt Lake City (licensed well driller in State of Utah) to drill the hole, install the casing and furnish and install a permanent pump for aquifer testing.

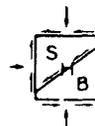


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APPENDIX D

Cost Estimate



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COST ESTIMATE

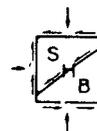
The following section presents our estimated costs for performing the base line data collection and analysis for the project. Charges for the work as described in Appendix C would be on a unit charge basis in accordance with our attached unit fee schedule. A summary of cost by task is as follows:

<u>Task</u>	<u>Estimated Cost</u>
Project Review and Orientation	\$1,260.00
Literature Collection and Review	\$5,310.00
Field Investigation and Surveys	\$6,930.00
Soil Laboratory Analysis & Classifications	\$2,120.00
Field Instrumentation Installation Personnel, transportation, etc.	\$2,970.00
Equipment and materials (cost + 10%)	\$11,500.00
Surface & Ground Water Monitoring and Sampling	\$5,040.00
Ground Water Monitoring Well Installation*	
SHB	\$800.00
Subcontract (cost + 10%)	\$29,150.00
Surface & Groundwater Testing, Subcontract (cost + 10%)**	\$5,232.00
Overburden, Underburden & Coal Strata Testing, Subcontract (cost + 10%)***	\$1,287.00
Monthly and Final Reports	\$13,000.00
Estimated Total	\$84,599.00

* Based on 500' deep, 10" diameter hole with 5" diameter slotted PVC pipe (\$50.00/foot of well) and suitable pump installed to collect water samples or to do pump test (\$1500.00 L.S. actual depth of well could change cost of pump installation).

** Based on \$130.35/surface water sample and \$101.75/ground water sample tested in accordance with parameters listed in RFP.

*** Based on \$127.60/overburden and underburden sample and \$37.40/coal sample-tested in accordance with parameters listed in RFP.



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UNIT FEE SCHEDULE

BASELINE DATA COLLECTION
 AND ANALYSIS
 SMALL OPERATOR'S ASSISTANCE PROGRAM
 SUMMIT COAL COMPANY
 BOYER MINE
 PR09/043/008
 SUMMIT COUNTY, UTAH

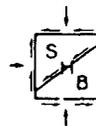
Personnel

Charges for services shall be subject to the following unit rates for all project related time including travel to and from project site:

<u>Personnel</u>	<u>Hourly Rate</u> <u>Regular</u>	<u>Hourly Rate</u> <u>Overtime</u>
Principals & Firm Officers	\$ 67.50	\$
Professional Engineers, Geologists & Hydrologists	45.00	
Staff Engineers, Geologists, Hydrologists - Office Work	38.25	
Staff Engineers, Geologists, Hydrologists, - Field Work	32.75	
Engineering & Geologic Aids	22.50	30.75
Word Processor Operator including equipment charges	19.75	27.00
Clerical	14.50	19.75
Draftsman	19.75	27.00

Miscellaneous Charges

<u>Item</u>	<u>Rate</u>
Printing - Plan Size Blueline, Mylars, Photo Reduction, etc.	Cost + 10%
Computer Usage (In-house Equipment)	7.50/hour
Computer Usage (Outside Time Sharing)	Cost + 10%



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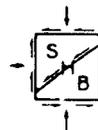
Miscellaneous Charges, Cont'd.

<u>Item</u>	<u>Rate</u>
1 Ton Pickup,	\$ 0.30/mile
Water Quality Sampling Equipment	15.00/day
Ground water Monitoring Instruments, Installation Materials, Subcon- tracts for Chemical Testing and Well Installation, etc.	Cost + 10%

Soil Laboratory Tests

Hydrometer Analysis	\$70.00
Specific Gravity	28.00
Moisture Content	3.50
Density of Undisturbed Sample	7.00

If services other than those quoted at this time are required for the project, due to changes in project details and/or scope of work, prices would be quoted at that time.



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**BASELINE DATA COLLECTION
AND ANALYSIS
SUMMIT COAL COMPANY
BOYER MINE, UPTON, UTAH.**

Proposal Prepared For:

**STATE OF UTAH
DIVISION OF OIL, GAS, AND MINING
SMALL OPERATORS ASSISTANCE PROGRAM**

REQUISITION NO. 587504



REDCON NORTH SALT LAKE CITY, UTAH

Resource Data Consultants



**MINE & MILL ENGINEERING, INC.
SALT LAKE CITY, UTAH**

SMALL OPERATORS ASSISTANCE PROGRAM

DIVISION OF OIL, GAS & MINING

STATE OF UTAH

REQ. NO. 587504

APRIL 3, 1985

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Section 2	Scope of Work
Section 3	Plan of Approach
Section 4	Project Schedule
Section 5	Organization Chart
Section 6	Key Personnel Task Description and Costs
Section 7	Summary of Qualifications and Experience
Section 8	Resumes

SECTION 1

SECTION 1

INTRODUCTION

The Summit Coal Company has requested the Division of Oil, Gas and Mining (D.O.G.M.), State of Utah to generate and furnish results of a Baseline Data Collection and Hydrological Study for a proposed deep coal mining operation on their Boyer Mine property located near Upton, Summit County, Utah.

The Small Operator Assistance Program (S.O.A.P.) dated April 3, 1985, requisition number 587504 is authorized under part UMC 795, Utah Code Annotated (UCA); 40-10-1 et. seq.. Included are provisions for the collection and analysis of hydrologic baseline data (quantity and quality) for both surface and ground water and the analysis of the physical and chemical properties of the overburden, coal, and underlying strata. The data collected will be used to determine probable hydrologic impacts of the proposed mining and reclamation and a statement of conditions of the overburden toward the hydrologic regime.

The determination and statement will be used by the small operator to apply for his permit to conduct mining operations. The D.O.G.M. will use the data collected and the accompanying report to determine whether mining should be allowed in the watershed at the particular site.

REDCON (Formerly MEIJI) in association with Mine and Mill Engineering, Inc. a division of Kerley Industries, Inc. of Phoenix, Arizona, possess a team of experts with substantial

experience and capabilities in coal mine development, regulatory permitting and hydrological studies. The team will consist of a Project Engineer, a Geologist, a Hydrologist, a Chemist, a Technician and a back up lab facility, to perform the necessary work requested in the R.F.P.

SECTION 2

SECTION 2

SCOPE OF WORK

REDCON (formerly MEIJI) in association with Mine and Mill Engineering, Inc. will provide the Division of Oil, Gas and Mining, State of Utah a team of experts for consulting services to execute the Scope of Work defined in their request for proposal 587504, dated April 3, 1985.

A. SURFACE WATER BASELINE INFORMATION

* Describe and map characteristics of watersheds in the permit area including:

- general site conditions
- physical location, elevation, geologic, hydrologic and average slope
- stream channel classification
- channel length
- average flows
- area and capacity of impoundments
- use and tabulation of water rights

* Research and compile all existing publications pertaining to flow and climatological data including;

- average annual high, low and mean flows in permit area
- historical extremes of drainage
- average monthly tabulation of precipitation, evapotranspiration, and temperature

* Collect baseline surface water data to satisfy Division guidelines including;

- collect data for one (1) year
- collect samples quarterly ^{AND} at approximately the high and low flows
- record rain fall *RUNOFF PRODUCING*
- record monthly flows in Chalk Creek and on the intermittent channel
- construct at least three (3) cross-sectional diagrams for each channel showing stream configuration for the 10 year and 100 year return period flow

E. PERMANENT CHANNELS?

* Cite narrative describing data collection, data methodology, instrumentation and reporting.

- * Construct maps that include;
 - regional geography, 1" = 2000'
 - local watersheds and sub-watersheds location, 1" = 2000'
 - monitoring sites and rain gauge locations

B. GROUND WATER BASELINE INFORMATION

* Describe and map characteristics of the ground water regime in the permit area. Research publications pertaining to local ground water conditions, including;

- aquifer boundaries, faults, geologic structures for groundwater occurrence
- water bearing strata formation
- all major seeps and springs; map scale 1" = 2000'
- active and inactive wells indicating depth, casing size, average flow, static water level, use, and water rights

-- well logs

* Collect baseline ground water data to satisfy Division guidelines, including;

-- collect data for one (1) year

-- measure levels monthly

-- collect samples quarterly at approximately the high and low table water elevation and measure parameters listed in Table 2

* Construct maps that include;

-- location of ground water monitoring points 1" = 2000'

-- diameter, total depth, static water levels, water rights, water use and lithology

C. OVERBURDEN, COAL STRATA AND UNDERLYING STRATA

* Describe and map the geology of the permit area including;

-- location and datum elevation of existing boreholes

-- extent of underground workings

-- submission of borehole logs

-- identification and estimate of thickness of strata and coal seam

* Perform chemical analysis to determine potential acid on toxic properties and physical aspects of the overburden, coal strata and underlying strata as listed in Table 3. Include pyritic sulfur and coal ash content.

D. RESULTS AND CONCLUSIONS

* Tabulate flows and analysis of surface water including;

- peak flow, low flow and monthly graphical representation of average flow for Chalk Creek and the intermittent channel
- correlation of runoff to precipitation
- chemical analysis for flows from all significant channels
- annual soil loss
- * Tabulate levels and analysis of ground water

including;

- high and low water levels and monthly graphical representation of average water level for all monitoring sites
- chemical analysis for samples from all monitoring sites
- determination of yields and capacities
- * Develop a Water Allocation for the proposed permit area.
- * Determine Probably Hydrologic Impacts of mining at

the proposed area and Statement of the Condition of the overburden including;

- surface water impacts
- ground water impacts
- changes in hydrologic balance
- overburden impacts to area
- final conclusions
- * Suggest mitigative actions.
- possible sediment pond location
- possible sites for compliance water monitoring

E. REPORT REQUIREMENTS

- submit a monthly narrative summary to the Division Lead Reviewer
- submit a partial draft report of findings to the Division within 240 days of effective date of contract. Results and conclusions need not accompany this draft.
- submit a complete draft report of findings with results and conclusions to the Division within 365 days of effective date of contract
- revise and submit a final report of findings with results and conclusions to the Division within 415 days of effective date of contract

TABLE 1

SURFACE WATER BASELINE WATER QUALITY PARAMETERS

Field Measurements:

- Flow
- pH
- Specific Conductivity (umhos/cm)
- Temperature (C^o)
- Dissolved Oxygen (ppm)

Laboratory Measurements: (mg/l)

- Settleable Solids
- Total Suspended Solids
- Total Dissolved Solids
- Total Hardness (as CaCO₃)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
- Carbonate (CO₃⁻²)
- Bicarbonate (HCO₃⁻)
- Cadmium (Cd)
- Calcium (Ca)
- Chloride (Cl⁻)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F⁻)
- Dissolved Iron (Fe)
- Lead (Pb)
- Magnesium (Mg)
- Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH₃)
- Nitrate (NO₃⁻)
- Nitrite (NO₂⁻)
- Potassium (K)
- Phosphate (PO₄⁻³)
- Selenium (Se)
- Sodium (Na)
- Sulfate (SO₄⁻²)
- Sulfide (S⁻)
- Zinc (Zn)
- Oil and Grease
- Cation-Anion Balance

TABLE 2

GROUND WATER BASELINE WATER QUALITY PARAMETERS

Field Measurements:

- Water Levels
- pH
- Specific Conductivity (umhos/cm)
- Temperature (C⁰)

Laboratory Measurements: (mg/l)

- Total Dissolved Solids
- Total Hardness (as CaCO₃)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
- Carbonate (CO₃⁻²)
- Bicarbonate (HCO₃⁻)
- Cadmium (Cd)
- Calcium (Ca)
- Chloride (Cl⁻)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F⁻)
- Dissolved Iron (Fe)
- Lead (Pb)
- Magnesium (Mg)
- Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH₃)
- Nitrate (NO₃⁻)
- Nitrite (NO₂)
- Potassium (K)
- Phosphate (PO₄⁻³)
- Selenium (Se)
- Sodium (Na)
- Sulfate (SO₄⁻²)
- Sulfide (S⁻)
- Zinc (Zn)
- Cation-Anion Balance

TABLE 3
OVERBURDEN ANALYSES PARAMETERS

<u>Parameter</u>	<u>Reported As</u>
- pH	Hydrogen ion activity
- Conductivity	mmhos/cm at 25°C
- Saturation	Percent
- Particle Size Analysis	Percent clay, silt, sand and very fine sand
- Texture	USDA textural class
- Soluble Ca, Mg and Na	meq/l
- Sodium absorption ratio	SAR calculated from soluble Ca, Mg and Na concentrations
- Carbonates	Percent
- Selenium	ppm to a lower detection limit of .01
- Boron	ppm
- Nitrate-Nitrogen	ppm
- Molybdenum	ppm to a lower detection limit of 0.1
- Mercury	ppm
- Acid Potential	meq H/100g or percent sulfur
- Neutralization Potential	percent CaCO ₃ or tons CaCO ₃ /1,000 tons material
- Acid-base Potential	tons CaCO ₃ /1,000 tons material
- Arsenic	ppm

SECTION 3

SECTION 3

PLAN OF APPROACH

GENERAL

REDCON (formerly MEIJI) in association with Mine and Mill Engineering, Inc. has assembled a team of experts to perform the Scope of Work outlined in Section 2 for the consulting services which will meet the requirements for the Division of Oil, Gas and Mining (D.O.G.M.), State of Utah, requisition number 587504.

The objective of this proposal includes:

- a). The determination of the probable hydrologic consequences of mining and reclamation
- b). The statement of the physical and chemical nature of overburden, coal formation and underlying strata as determined from test borings or core samples

Performance of the monitoring and research study will be under the direction of qualified personnel from the Technical Department of Mine and Mill Engineering, Inc. located in Salt Lake City, Utah. Direct management and responsibility for execution and coordination of this program will be assigned to an experienced Project Engineer. Full use will be made of the services of Mine and Mill Engineering technical personnel and laboratory facility. This study will be accomplished in five (5) stages plus a concluding report as follows:

STUDY PLAN AND REVIEW

When REDCON/M&ME has been notified of the study award, a date will be set for the initial project meeting between the Division of Oil, Gas and Mining, State of Utah, and key personnel from the project team. The objectives of this meeting will be to clarify project procedures and establish channels of communications between the Division and the project team. A site visit to the mine site will be scheduled.

After the initial meeting and mine site visit, all available data, information and documentation will be transferred to the project team. The information will be reviewed and a detailed project plan will be formulated to address the plan of approach; the objectives; the reporting format; the items of concern; and the final report format.

REDCON/Mine and Mill Engineering, Inc. envisions the monitoring and research study to consist of:

- * Research of related and pertinent information
- * Physical description of permit area surface features
- * Identification of strata beds
- * Geological and geographical mapping of the permit area
- * Location and mapping of surface and ground water sources
- * Measuring surface water and ground water yields, flow rates and levels
- * Sampling of significant surface and ground water sources

- * Chemical and physical analysis of surface watch ground water, and available core samples

During the course of this study, a monthly progress summary will be furnished to the Division for review, comments and approval.

DOCUMENT RESEARCH

REDCON/M&ME understand the necessity of securing backup information to assist the study. We will conduct a literature and documentation search to aid in the geological, hydrological, surveying and mapping efforts. Possible sources for literature include:

- Division of Oil, Gas and Mining - State of Utah
- Technical Library at Mine and Mill Engineering, Inc.
- Libraries at the Department of Mining and Fuels and Marriott library - University of Utah
- U. S. Bureau of Land Management
- Utah State Geological Service
- Utah Coal Association
- Utah State Division of Water Resources and Water Rights
- Summit County Court House

SITE DESCRIPTION AND MAPPING

Local geographic and geologic maps of the proposed permit area are available through the Division and mine operator. The Scope of Work described in Section 2 requires a detailed description of surface features including; wells, springs, creeks, lakes, impoundments, elevation markers, landmarks, terrain

contours, installations, roads, vegetation and geologic strata.

A project team consisting of a geologist and hydrologist under the direction of the Project Engineer, will be responsible for updating, adding to and organizing existing data available. They will provide a property description; locate and identify coal seams and strata; and construct geographic and geologic maps to scale required of permit area.

FLOW & LEVEL DETERMINATIONS

After the significant surface and ground water sources have been identified and mapped, a hydrologist will determine the flow rates, yields and levels. Weirs and flow instruments will be installed to monitor surface water for high, low and average flow rates periodically as described in the Scope of Work section. The ground water monitoring points will be measured for yield and levels periodically as described in the Scope of Work.

WHAT
KIND

Precipitation will be measured during the flow rate and sampling efforts. Total runoff from the permit area will be determined from the combined effects of surface water, ground water and precipitation.

Terrain and soil profiles will be examined and an estimated soil erosion and sediment yield determined.

HOW?

At least three (3) cross sectional stream and channel profiles of each significant drainage will be constructed. A 10 year and 100 year return period flow from each channel will be calculated.

Any necessary well drilling to obtain ground water monitoring sites will be evaluated and action taken early in the study.

A Water Allocation or availability will be determined from calculated channel flow rates and runoff for the permit area. The water availability will be necessary for future mine facility planning.

WHAT FOR

SAMPLING AND ANALYSIS

Coincident with measuring flow rates and levels, a sampling program will be developed and undertaken as described in the Scope of Work. The surface and ground water samples will be collected and sent to Mine and Mill Engineering, Inc. laboratory for analysis. The trace elements cation, anion, and contaminants listed in Tables 1 & 2 will be determined.

Four (4) exploration boreholes were cored in 1982 and are available through the Division for chemical and physical analysis. Overburden in the permit area will be analyzed for the parameters listed in Table 3 in Mine and Mill Engineering, Inc. lab. Coal seam thickness and geologic strata will be identified and mapped. Coal seam pyritic sulfur and ash will be determined.

REPORT PREPARATION

A series of reports will be prepared throughout the study to satisfy Division of Oil, Gas and Mining guidelines. REDCON/M&ME will submit interim, narrating monthly reports to the Division by the 15th of the following month. The first of these

narratives will be submitted on approximately the 45th day following award of contract. A total of eleven (11) interim narrative reports will be prepared and submitted to the Division every 30 days. The last of the eleven (11) narratives will be due approximately 345 days after award of contract. These narratives will provide a monthly summary on document research, site description, mapping, flow and level determinations, sampling results and related data.

A partial draft report will be prepared and submitted to the Division approximately 240 days after the study award. This report will include a summary to date of parameters described under monthly interim reports. The Division will review the draft for technical and physical deficiencies and return the report within 30 days with a detailed critique of inadequacies. The partial draft report will be corrected and returned to the Division by day 300. No final conclusions need be included in this report.

A complete draft report will be submitted to the Division by day 365 for review and comments. The Division will return the draft within 30 days. A final copy of the report with permit area findings, mapping, determinations, impacts and conclusions will be submitted to the Division by day 415. Upon approval of the final report REDCON/M&ME will submit eight (8) copies to complete the study requirements.

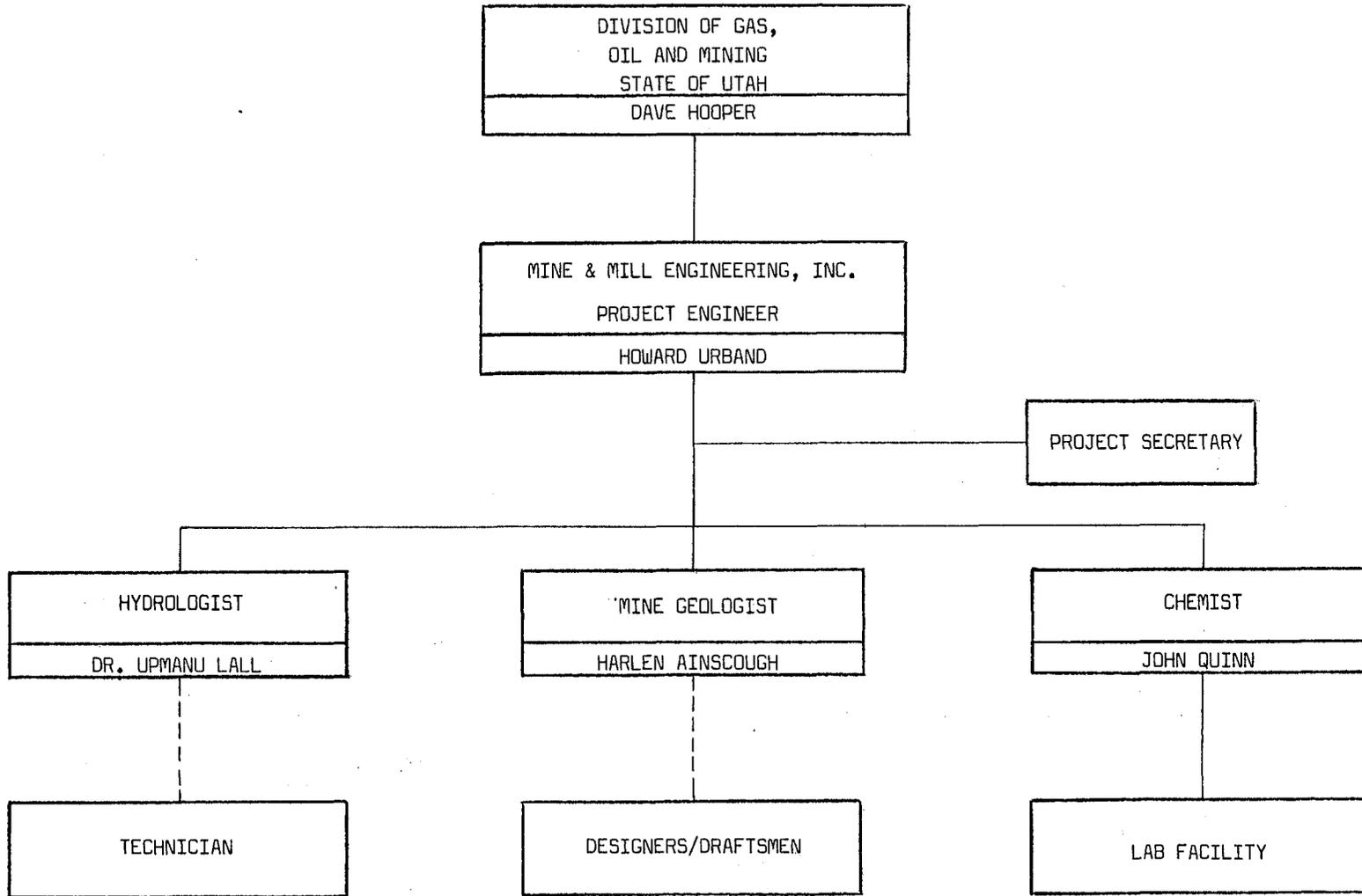
SECTION 4

PROJECT SCHEDULE

SECTION 5

ORGANIZATION CHART

ORGANIZATION CHART



SECTION 6

KEY PERSONNEL TASK
DESCRIPTION AND COSTS

SECTION 6

KEY PERSONNEL TASK DESCRIPTION AND COSTS

The following is an estimate of time to be expended for the five (5) phases of the project and submission of the final report. These are estimated hours only and are subject to revision.

	STUDY PLAN DOCUMENT &-REVIEW	RESEARCH & MAPPING	SITE DESCRIPTION	FLOW & LEVEL DETRMINATION	SAMPLING & ANALYSIS	FINAL REPORT
PROJECT ENGR.	20	20	40	-	-	120
GEOLOGIST	40	50	80	-	80	80
HYDROLOGIST	40	50	40	40	80	80
CHEMIST	-	-	-	-	300	60
TECHNICIAN	-	-	-	160	160	-
DRAFTSMAN	-	-	320	-	-	-
TOTAL HOURS	100	120	480	200	620	340

TOTAL ESTIMATED HOURS - 1860

PHASE ONE

STUDY PLAN AND REVIEW

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Project Engineer	20	\$45/Hr	\$ 900.00
Geologist	40	\$36/Hr	1440.00
Hydrologist	40	\$36/Hr	<u>1440.00</u>
TOTAL			\$3780.00

COMMUNICATIONS

@ Cost

REIMBURSABLE COSTS

1. Travel @ \$0.25/mile
2. Lodging and Food at Cost
3. Telephone, Office Supplies at Cost

PHASE TWO
DOCUMENT RESEARCH

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Project Engineer	20	\$45/Hr	\$ 900.00
Geologist	50	\$36/Hr	1800.00
Hydrologist	50	\$36/Hr	<u>1800.00</u>
TOTAL			\$4500.00

MATERIALS AND SUPPLIES

@ Cost

COMMUNICATIONS

A Cost

TRAVEL EXPENSES

Lodging and Auto at Cost
Mileage - \$0.25/Mile

PHASE THREE

SITE DESCRIPTION AND MAPPING

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Project Engineer	40	\$45/Hr	\$ 1800.00
Geologist	80	\$36/Hr	2880.00
Hydrologist	40	\$36/Hr	1440.00
Draftsman	320	\$24/Hr	<u>7680.00</u>
TOTAL			\$13800.00

MATERIALS AND SUPPLIES

@ Cost

COMMUNICATIONS

@ Cost

TRAVEL EXPENSES

Lodging and Auto at Cost
Mileage - \$0.25/Mile

PHASE FOUR

FLOW AND LEVEL DETERMINATIONS

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Hydrologist	40	\$36/Hr	\$ 1440.00
Technician	160	\$24/Hr	<u>3840.00</u>
TOTAL			\$ 5280.00

MATERIALS AND SUPPLIES

Flow and level metering and
hydrological instrumentation \$ 8000.00

COMMUNICATIONS

@ Cost

TRAVEL EXPENSES

Lodging and Auto at Cost
Mileage - \$0.25/Mile

PHASE FIVE

SAMPLING AND ANALYSIS

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Geologist	80	\$36/Hr	\$ 2880.00
Hydrologist	80	\$36/Hr	2880.00
Chemist	300	\$27/Hr	8100.00
Technician	160	\$24/Hr	<u>3840.00</u>
TOTAL			\$17700.00

MATERIALS AND SUPPLIES

@ Cost

COMMUNICATIONS

@ Cost

TRAVEL EXPENSES

Lodging and Auto at Cost
Mileage - \$0.25/Mile

FINAL REPORT

<u>STAFF</u>	<u>HOURS</u>	<u>RATE</u>	<u>TOTAL</u>
Project Engineer	120	\$45/Hr	\$ 5400.00
Geologist	80	\$36/Hr	2880.00
Hydrologist	80	\$36/Hr	2880.00
Chemist	60	\$27/Hr	<u>1620.00</u>
TOTAL			\$12780.00

MATERIALS AND SUPPLIES

@ Cost

COMMUNICATIONS

@ Cost

TRAVEL EXPENSES

Lodging and Auto at Cost
Mileage - \$0.25/Mile

COST SUMMARY

<u>SECTION</u>	<u>COST</u>
Phase One	\$ 3,780.00
Phase Two	4,500.00
Phase Three	13,800.00
Phase Four	13,280.00
Phase Five	17,700.00
Final Report	12,780.00
Fee	<u>3,800.00</u>
TOTAL	\$69,640.00

The above cost summary excludes other direct costs such as travel, boarding and lodging, office supplies and telephone.

These will be invoiced at cost with no mark-ups.

SECTION 7

SECTION 7

SUMMARY OF QUALIFICATIONS

AND EXPERIENCE

This section provides the overall summary of the participating team organizations. This multi-disciplinary team approach has been utilized in various projects with effective results in the performance of the work within the desired budget and schedule.

MINE AND MILL ENGINEERING, INC. (M&ME)

Mine and Mill Engineering, Incorporated, established in 1982, has successfully completed projects in the United States. This organization has grown from a company of half-dozen engineers to a comparably large Utah engineering/construction management firm; it provides services to industry and government.

OFFICES

M&ME is based in Salt Lake City, Utah. Other offices are located in Denver, Tucson and Phoenix and offer a variety of services to the mining industry.

AREAS OF ACTIVITY

M&ME specializes in the following activities:

- o Exploration
- o Geological and Hydrological Studies
- o Feasibility Studies
- o Detail Design

- o Mine Design
- o Equipment Sizing and Selection
- o Mine Planning and Development
- o Process Metallurgy
- o Cost Studies - Capital and Operating
- o Mining and Process Evaluation
- o Hazardous Waste Disposal Studies
- o Environmental Studies
- o Construction Management

Support departments provide engineering, procurement and construction management services as required, to all projects.

COMPANY STAFF

M&ME staff have over 100 years of combined experience. The personnel have gained experience with some of the largest engineering and construction firms in the United States. As such, they bring this experience to projects which demand such expertise at competitive rates.

REDCON/M&ME will provide the Division of Gas, Oil and Mining, State of Utah, a pool of expertise and the professional resources based in Salt Lake City and in close proximity to the Division's offices, providing the essential elements of logistics, communication and project control for the cost effective success of the project.

EXPERIENCE OF PROJECT PERSONNEL

The combined organization team has scientific, engineering,

technical, operations and support personnel. Within this staff of personnel are experienced professionals with an in-depth knowledge of the coal mining operations required for the proposed study of Summit Coal Company's coal mining project and resources. This section provides the representative selection of project personnel by discipline who are proposed to perform this project.

PROJECT ENGINEER

Mr. Howard Urband will be responsible for directing, coordinating and implementing the Scope of Work of the study. He has directed mine exploration and development projects in the United States and abroad. He has prepared mine site maps, and formal geological reports. His experience extends to land acquisition, mine site evaluation, and project planning to bring prospective mines into production on schedule. He is currently responsible for several on-going mine evaluation and development projects for Mine and Mill Engineering, Inc.

HYDROLOGIST

Dr. Upmanu Lall will be responsible for the hydrological data collection including surface and groundwater monitoring. He has compiled and prepared hydrological data for mine permit application for the Boyer Coal Mine, Upton, Utah. The work included review of all available published literature, sedimentation pond recommendations, drainage diversion structure recommendations, surface water hydrology, water quality, and water rights review. He also conducted computer groundwater modeling, determined aquifer flow rates, water quality and chemical testing. He is currently responsible for ground and surface water hydrology calculations and summary reports for mine sites, industrial sites and commercial developments.

MINE GEOLOGIST

Mr. Harlen R. Ainscough will be responsible for the geological and mapping determinations of the study. He has over 12 years experience in coal mine evaluation and development including; core drilling, mine permitting, mapping, reserve estimates, strata identification and mine surface description. He has directed strip and underground coal mine planning, economic and feasibility studies, environmental studies and property acquisitions. He presently directs all geological programs for a large coal mining company.

CHEMIST

Mr. John Quinn will direct the chemistry and laboratory portion of the study. He has nearly 30 years of diversified experience in organic and inorganic chemical applications and process development. His experience extends to all forms of quantitative and elemental analysis of water, organic extractants and mining flotation reagents. He is currently responsible for research and development. He has conducted research on water and waste water treatment in mining and industrial operations.

In addition to his chemical expertise, he has had extensive experience in marketing, managing and scheduling operations in large analytical laboratories.

SECTION 8

RESUMES

RESUME

HOWARD T. URBAND

DATE OF BIRTH: 1931

EDUCATION: B. S. Geology
University of Idaho - 1956

18 Credit Hours - Post Graduate Work
Geology, University of Southern California

PROFESSIONAL
AFFILIATIONS: Licensed Professional Geologist
Colorado Mining Association -
Public Lands Committee
Society of Mining Engineers (AIME)
American Institute of Professional Geologists
Member, Speakers Bureau (Westinghouse)
Mining Club of the Southwest

HONORS: NROTC Scholarship Recipient
Sigma Gamma Epsilon - Earth Science Honorary
Scabbard and Blade Military Honorary

LANGUAGES: Conversational Spanish

CAREER PROFILE

Mr. Urband has over 20 years experience in exploration, development, production, geology and mining in the United States and abroad, and has been instrumental in locating and developing several new mines. He has a strong background in technical writing, editing, map preparation and formal presentation. He has worked extensively with precious metal deposits, placers, massive sulfides, phosphates, porphyry deposits and uranium, and has had broad experience with land acquisition and evaluation as well as claim patenting. As Manager of Mine Development, he has been responsible for planning and execution of the full range of exploration and developmental activities required to bring new deposits into production on schedule and within budget.

HOWARD T. URBAND

Page 2 of 3

Mine and Mill Engineering, Inc. - Salt Lake City, Utah

PROJECT GEOLOGIST

EXPERIENCE PROFILE

EXPLORATION GEOLOGIST

As Manager of African and Latin American projects, He has been responsible for generation of prospects, acquisitions of land, and the evaluation of concessions for diamonds, gold and copper.

Domestically, he successfully located new deposits of gold, copper and uranium and is familiar with a wide variety of ore deposits and geologic settings.

DEVELOPMENT GEOLOGIST

He has been in charge of proving up and patenting large groups of mineral claims, contributed substantially to ore development work leading to the production of gold. He has been responsible for the development of both hard rock and sedimentary uranium ore bodies for feasibility study preparation.

PRODUCTION GEOLOGIST

He has performed as production geologist in both copper and phosphate mining and has been heavily involved in mine planning and reserves calculations. In his role as production geologist for a phosphate mine in Florida, he pioneered the system for the disposal of surface waters with reverse flow water wells, a process that is in current use industry-wide today. He has also been responsible for the location of new water sources for mining and milling in the desert Southwest.

MANAGEMENT PLANNING/ BUSINESS DEVELOPMENT

During his career with Westinghouse, he received formal training in supervision and management. As a project chief and as Manager of Mine Development, he demonstrated his planning skills by managing three (3) field offices and a home office support staff with an annual budget of over \$4 million.

HOWARD T. URBAND

Page 3 of 3

As an officer of Exploration and Development Associates (E.D.A.), he set up a new company to perform exploration and development work on a contract basis, generated new business for the company and successfully performed services for client companies based on their individual corporate strategies.

Current Responsibilities

Dr. Lall's current responsibilities include preparation of ground water and surface water hydrology calculations and summary reports for mine sites, industrial sites, and commercial developments. He is also a member of the University of Utah, serving as an assistant professor and has taught courses in ground water hydrology, advanced hydrology, hydraulics, water resources engineering, and computer analysis.

Selected Task Assignments

Corrective recommendations and assessment for ground water and drainage problems on the Willows Condominium project, involving 15 acres of landscaping buildings and parking structures adversely affected by flooding and high ground water in the Salt Lake Valley.

Preparation of entire hydrology section for mine permit application for the Boyer Coal Mine near Coalville, Utah. Work included review of all pertinent available published literature, sedimentation pond recommendations, drainage diversion structure recommendations, surface water hydrology, water quality considerations, and water rights review. All information was assimilated into report form for inclusion in a mining plan permit application.

Ground water and surface water hydrology studies for Soldier Creek Coal Mine near Wellington, Utah. Studies included computer ground water modeling with emphasis on aquifer flow rates, contaminant transport, and pollutant level prediction relative to current mining and future mining plans. Water well data, water chemical tests, and geology information were utilized in this final assessment required by the Utah Department of Oil, Gas & Mining.

Education

1981, Ph.D., Civil Engineering, University of Texas, Austin
Hydrology Speciality
1980, M.S., Civil Engineering, University of Texas, Austin
1976, B.Tech., Civil Engineering, Indian Institute of Technology,
Kanpur

Certifications/Recommendations

Engineering Training (E.I.T.), Texas, 1980

Professional Affiliations

Member, American Water Resources Association
Member, International Water Resources Association
Associate Member, ASCE
Member, American Geophysical Union

Member, U.S. Committee on Irrigation and Control of Drainage
Member, AGU, National Committee on Surface Runoff

Publications and Presestations

Lall,U. and L.R. Beard, "An assessment of risk and uncertainty in flood frequency analysis", 19th Annual AWRA Conference, San Antonio, Texas, October, 1983.

Lall,U., "A strategy for least cost design of pumping operations for open pit mine dewatering", 11th Annual Rocky Mountain Ground Water Conference, Salt Lake City, Utah, 1982.

Lall,U. and L.R. Beard, "Value of data in relation to uncertainty and risk", CRWR Report, Univ. of Texas, Austin, September 1981.

Santini,M. and U. Lall, "Optimal sizing of storm water detention basins", Storm Water and Flood Management Engineering Foundation Conference, 1983.

RESUME

HARLEN R. AINSCOUGH

EDUCATION:

Indiana State University,
Terre Haute, Indiana August 1974
Masters of Arts in Geology -
Master's thesis consisted of coal
trace element research aided by
grants from the AAPG and Indiana
Academy of Science.

Indiana State University,
Terre Haute, Indiana August 1972
Bachelor of Science in Geology -
Bachelor's thesis consisted of
air photo interpretation of
structural lineaments in the
Snake River area of Idaho and
Oregon.

PROFESSIONAL AFFILIATIONS:

American Institute of Professional Geologists
American Institute of Mining Engineers
Rocky Mountain Coal Mining Institute

CAREER PROFILE:

Mr. Ainscough has over 12 years experience in all phases of coal mine geology, including; supervision, core drilling, mine permitting, mapping, reserve estimates, economic evaluations, geologic modeling, environmental, and regulatory agency coordination. His experience covers coal fields in Wyoming, Colorado, Utah, New Mexico, Montana, Washington, Illinois, Missouri, Indiana and Kansas. He is currently responsible for coordinating all geological programs of an active coal mining company.

Mine and Mill Engineering, Inc., Salt Lake City, Utah.

MINE GEOLOGIST

Panorama Resource Services, Inc. Raton Basin, Colorado. Evaluated coal outcrops and in-mine seams for active and inactive mines. Supervised drilling program design, permitting, and data collection. Established procedures for geotechnical data gathering and provided layout and supervision for dozer-cut program. Responsible for analysis of coal mine seam deposits. Supervised mapping of roof lithologies, calculated coal seam stability and coordinated multiple seam strip operations.

HARLEN R. AINSCOUGH

Page 2 of 3

Provided design and coordination of overburden testing program and analysis of faults affecting strip operations. Established a geologic description for strip pit permit application and produced exploration drilling permits. Calculated breakeven, maximum highwall ratios for varying clean coal recovery percentages for properties with variable economic parameters. Determined reserves and ratios in respect to practical pit slopes and safety bench requirements and prepared summary reports. Prepared 10K/annual report reserve for SEC filings including overburden swell (bulking) diagrams and presented to top management.

D. H. Emling Company, Denver, Colorado. Conducted a geologic evaluation and coal quality mapping of multiple seam surface minable reserves, San Juan Coal Region, New Mexico. Calculated deep coal reserve estimates of steeply dipping seams, Piceance Basin, Carbondale Coal Field, Colorado. Determined coal field development potentials, identified coal producer/reserve owners and categorized properties for possible acquisition in Utah, Colorado, Wyoming and Montana. Supervised overburden toxic material drilling program, Powder River Basin, Wyoming. Conducted surface and deep minable reserve evaluations and depositional modeling of several properties, Raton Basin Coal Field, Colorado. Reconstructed a coal reserve base of a mined out area and determination of potential adverse effects of leasing small tracts, Centralia-Chehalis Coal Field, Washington. Prepared geologic requirements of mining permit applications for Wyoming and Colorado. Coordinated mining permit application preparation for the state of Wyoming.

Wescar, Inc., Denver, Colorado. Responsible for geologic evaluation of company held reserves, Posey County, Indiana. Implemented a systematic approach to target coal resource areas for detailed geologic evaluation, Northern and Western Illinois. Conducted a geologic evaluation and depositional modeling of deep minable resources, East-Central Illinois. Provided design, budgeting and implementation of drilling and coal analysis programs, Posey County, Indiana. Prepared a detailed fault study with models and maps derived from oil well geophysical logs, Posey County, Indiana. Responsible for design and supervision of coal reserve check drilling program and evaluation, Missouri-Kansas. Supervised preliminary evaluation of resource potential of steeply dipping seams, Coalville Coal Field, Utah.

HARLEN R. AINSCOUGH

Page 3 of 3

Atlantic Richfield Company, Denver, Colorado. Explored low sulfur coal reserves in deep basin areas resulting in recognition of three (3) low sulfur coal deposits, Central and East Central Illinois. Responsible for design, budgeting and implementation of field drilling programs, Central and Southern Illinois. Prepared detailed geologic evaluation and report on company low sulfur reserve block, Central Illinois. Trained and supervised summer field geologists, Illinois and Indiana. Supervised coal coring programs on two (2) large surface mines, Powder River Basin, Wyoming. Conducted evaluation and stratigraphic interpretation of surface mine reserves, Powder River Basin, Wyoming. Reviewed third party study on trace element content of surface minable coal, Powder River Basin, Wyoming.

RESUME

JOHN E. QUINN

DATE OF BIRTH: 1933

EDUCATION: M. S. Organic Chemistry, St. Joseph's
University - Philadelphia, Pennsylvania
1959

B. S. Chemistry, Ursinus College -
Collegeville, Pennsylvania
1954

PROFESSIONAL
AFFILIATIONS: A.I.M.E.
A.C.S.

CAREER PROFILE

Mr. Quinn has over 29 years diversified experience in organic and inorganic chemical applications and process development. His experience extends to all forms of quantitative and elemental analysis of water, waste water, chelating agents, mining flotation reagents, petrochemical complexing agents, agricultural chemicals, pharmaceuticals and cosmetics. He is currently responsible for a research and development group in a large analytical laboratory.

Mine and Mill Engineering, Inc. - Salt Lake City, Utah

CHIEF CHEMIST

EXPERIENCE PROFILE

MANAGER OF RESEARCH AND DEVELOPMENT

Kerley Industries, Inc. - Tucson, Arizona. Responsible for supervision, planning and scheduling of large analytical lab facility, including chemical and fire assay, atomic adsorption, elemental analysis and all research development projects. Formulated processes for manufacture of mining flotation chemicals and developed quality control procedures. Provided business market research, production forecasts and return on investment analysis.

JOHN E. QUINN

Page 2 of 3

PRESIDENT

Q Z Mining Chemicals, Inc. Division of Kerley Chemicals, Inc., Tucson, Arizona. Responsible for product development, quality control, analytical procedures, planning, sales and distribution of mining flotation and industrial chemicals. Areas of research development include water and waste water treatment, secondary and tertiary oil recovery, surfactant technology, mineral processing, froth flotation, transport and management of hazardous waste material.

DIRECTOR

Betz Laboratories, Inc., Commercial Development Department, Arizona. Responsible for business development, new product line and development of water and waste water treatment chemicals for the mining, industrial chemical, petrochemical and pharmaceutical industries.

MANAGER

Betz Laboratories, Inc., Market Research Department, Pennsylvania. Responsible for market research and development of industrial chemicals used in water and waste water treatment facilities.

SUPERVISOR

Betz Laboratories, Inc., New Product Planning, Pennsylvania. Introduced new product lines of industrial chemical for water and waste water treatment facilities. Supervisor and coordinator over district sales group.

MARKET DEVELOPMENT SPECIALIST

General Electric Company - Massachusetts. Developed new marketing programs for several groups of industrial chemicals including polysulfides and carbonates, provided sales planning and scheduling.

VICE PRESIDENT

Schulmerich Electronics Company. Responsible for production and operation of electronic assemblies for industrial electrical controls. Supervised computer operators.

JOHN E. QUINN

Page 3 of 3

MANAGER/RESEARCH CHEMIST

Pennwalt Chemicals Corporation - Pennsylvania. Responsible for market research and sales development for industrial chemicals used in the water and waste water treatment, petrochemical, rubber and pharmaceutical industries. Conducted various analytical and chemical testing programs to verify performance standards.