

September 21, 2020

Mr. Dan Walsh  
Bureau Chief  
Montana Department of Environmental Quality - Hard Rock Mining Bureau  
1520 E. 6th Avenue  
Helena, Montana  
USA, 59601

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Dear Mr. Walsh,

**RE: 2020 EOR Site Inspections**

The Montana legislation requires that the engineer of record (EOR) inspect a tailings storage facility (TSF) annually during operation (MCA 82-4-381. Annual Inspections). The EOR must also prepare a report (Annual Inspection Report or AIR) describing the scope of the inspection and actions recommended to ensure the TSF is properly operated and maintained. The AIR is to be submitted to the operator and to the department (MDEQ).

As you are aware, I am the Engineer of Record for several TSFs in Montana, and under normal circumstances, I would personally visit each of these sites at some point during the 2020 calendar year. However, the current COVID-19 pandemic and the associated public health restrictions relating to travel have prevented me from visiting the Montana TSF sites so far this year, and it is also unlikely that I will be able to travel to these Montana sites before year end. I am writing to propose an alternative arrangement, that is acceptable to me as the EOR, and is hopefully also acceptable to MDEQ.

I am proposing that Mr. Allen Gipson (PE) will conduct the 2020 TSF inspections at each of the TSF sites, as a suitably qualified representative of the EOR. Mr. Gipson is a highly respected and well qualified colleague, who has over 50 years of relevant design and operating experience. He is an international expert who would meet the technical requirements for an EOR as outlined in the Montana legislation, and he also has equivalent Professional Engineering certifications for Colorado and Wyoming. A copy of his resume is attached.

I will retain responsibility for the preparation of the AIR. Mr. Gipson will review specifics of each of the TSFs with me prior to the site visit; we will review recent and relevant drone video footage, and will agree on general expectations as well as the timing and locations for his visual inspection at each facility. He will be accompanied by mine personnel (from the operator) that are suitably familiar with the respective TSFs.

Mr. Gipson has conducted numerous such dam safety inspections during his long and distinguished career. He indicates that he would endeavor to communicate with me during his site inspections, as practicable and appropriate, and would also utilize a Camcorder to obtain video footage as and where necessary during the inspections.

We have selected the week of October 12, 2020 for the Annual Inspections. Mr. Gipson is planning to visit four TSFs during the week, including the Montana Resources TSF near Butte, plus the East Boulder TSF near Big Timber, and the Nye and Hertzler TSFs near Columbus. I am the EOR for each of these TSFs and will rely on Mr. Gipson's observations in the preparation of the respective AIRs for these facilities.



Please feel free to inform me if you have any concerns or suggested modifications for the proposed procedures for these 2020 Annual Inspections.

Best Regards,  
**Knight Piésold Ltd.**

Prepared:	_____	Reviewed:	_____
	Ken Brouwer, P.E. Principal		Dan Fontaine, P.E. Specialist Engineer   Associate

Reviewed: \_\_\_\_\_  
Craig Hall, P.Eng.  
Specialist Geotechnical Engineer  
Associate

Approval that this document adheres to the Knight Piésold Quality System:

**Attachments:**  
Resume: Allen Gipson

Copy To: Mark Thompson (Montana Resources), Matt Wolfe (East Boulder Mine),  
Randy Weimer (Stillwater Mine)

/kjb

## ALLEN H. GIPSON, JR., P.E.

### CONSULTING ENGINEER



#### SUMMARY

Mr. Gipson is a Senior Consultant in Knight Piésold's Denver, Colorado practice. He is a geotechnical engineer and geologist with nearly 50 years of experience in design, construction and operation of tailing management facilities, heap leach projects, and water and process fluid retention ponds and dams. The tailing management facilities range in size to over 1 billion tons and embankment heights in the range of 1000 feet. He has also coordinated site selection studies for major projects. In addition, Mr. Gipson has also provided forensic evaluations and remedial designs for several dozen projects. He has been the responsible professional on hundreds of projects throughout the United States and in Peru, Honduras, Bolivia, Chile, Panama, Kazakhstan, Spain, Sweden, Mali, Burkina Faso, Ghana, Cameroon, Sierra Leon, Saudi Arabia, New Caledonia, Brazil, Panama, Fiji, Canada, and Chile. He is a licensed professional engineer in Colorado, and Wyoming and a licensed professional geologist in Wyoming.

Mr. Gipson has organized and presented short courses on seepage and engineering geology to the Association of State Dam Safety officials. He has conducted safety evaluations on a number of dams and responded to emergency situations on seven dams. On two of the dams, reservoir drawdown commenced immediately and, at another, immediate temporary repairs were undertaken. He has provided litigation support for a number of projects. Mr. Gipson has also worked as a senior reviewer on numerous projects both within and outside Knight Piésold.

His experience includes geotechnical engineering, engineering geology, water resources, design, construction, and multi-disciplinary project management. He has dealt with personnel from many agencies including the New Mexico State Engineer's Office, the Environmental Protection Agency, the Nevada Department of Environmental Quality, the Nevada Division of Water Resources, the Colorado State Engineer's Office, the Colorado Division of Mines, the Alaska Division of Dam safety, the Tampa Bay Regional Planning Council, the Hillsboro County Board of County Commissioners, the Colorado Department of Public Health and Environment, the Wyoming State Engineer's Office, and the Wyoming Industrial Siting Council and numerous others.

Brief summaries of typical projects Mr. Gipson has participated are presented below. The projects are categorized under the following headings:

- Phosphate Experience Including Phospho-Gypsum Storage Facilities
- Forensic Studies and Litigation Support
- Tailing Storage Facilities
- Heap Leach Pads
- Water Storage Dams
- Hazardous Waste and Lined Ponds
- Reclamation/Closure
- Geotechnical Investigations

#### EDUCATION

M.Sc. Civil Engineering, University of Kansas, USA, 1970

B.Sc. Civil Engineering, University of Kansas, USA, 1968

B.Sc. Geology, University of Kansas, USA, 1967

Post Masters Studies at the Colorado School of Mines in Rock Mechanics and Engineering Geology

#### REGISTRATION/CERTIFICATIONS/TRAINING/AFFILIATION

Professional Engineer in Colorado and Wyoming.

Professional Geologist in Wyoming

Chi Epsilon, National Civil Engineering Fraternity

Mining and Metallurgical Society of America

#### PROFESSIONAL EXPERIENCE

Following are descriptions of a few of the typical projects Mr. Gipson has worked on throughout his career.

## Phosphate Experience Including Phospho-Gypsum Storage Facilities

- **Gypsum Stack Expansion, Wyoming, USA** – Geotechnical and hydrological investigations, laboratory testing, stability analyses, and design recommendations for the expansion of an existing cross-valley gypsum stack to five years of storage capacity. The phosphoric acid plant produces 250,000 tons per year of P205, and generates about 1,250,000 tons per year of gypsum. The stack was originally designed as an HDPE-lined cross-valley structure covering 400 acres, with a 3,800-foot- long, 50-foot-high starter dike. As an interim measure, the existing stack will be redesigned as a four-sided facility covering about 140 acres with 50 acres of process water ponds. The interim stack will have an overall height of 110 feet. Recommended design criteria developed for the interim stack included a sub-aerial deposition system, decant system near the middle of the separation dike, embankment raises and perimeter drains. For SF Phosphates.
- **Existing 300-Acre Gypsum Field, Tampa, Florida, USA** – Mr. Gipson provided geotechnical investigations to evaluate the stability of the existing field and future raises. He also provided hydrologic services to minimize seepage losses from the field. Following construction of a covered ditch around the toe and a “herringbone” shallow drainpipe system on the slopes the slopes were covered with topsoil and grassed. The field was constructed to about a height of 350 feet.
- **Lateral Expansion Existing 300-Acre Gypsum Field, Tampa, Florida, USA** – An alternate to increase gypsum storage was to expand north and east sides of an existing active gypsum field as an alternate gypsum storage field to gain an additional 100 acres of land for gypsum storage. The existing field is 120 to 150 feet high with an enclosed perimeter dike crest length of approximately 11,000 feet. The planned height of the existing and expanding gypsum field will be about 350 feet, and deposition in the alternate storage field was planned to begin in about 1985.

Mr. Gipson evaluated the suitability of the site for the proposed expansion, the effects of the expansion on the existing gypsum disposal field and potential seepage from the expanded field, and recommendations on how to handle the seepage. Recommendations on gypsum slurry deposition and decanting in the expansion area were also presented. For Gardinier, Inc.

- **326-Acre Gypsum Field, Tampa, Florida, USA** – Mr. Gipson directed geotechnical and hydrological consulting engineering services for the proposed field. The field was designed to be underlain by a clayey soil lining overlain by a leachate collection and detection system. The slurry fluid used to transport the waste had a pH of about 2.0. This work includes: (1) extensive field and laboratory work; (2) evaluation of surface depressions (possible sink holes), subsurface water conditions, pond lining and monitoring system alternatives embankment drain systems; (3) slope stability and seepage analyses; and (4) design for the gypsum field. He also provided assistance to Gardinier, Inc. during project permitting.
- **Technical Witness for Design and Permitting 326 Acre Gypsum Field, Florida, USA** – Served as the design engineer and key technical witness for the design and permitting for a new phosphogypsum disposal field within the city limits of Tampa, Florida. Permits for the project needed to be obtained from the Environmental Protection Agency, Tampa Bay Regional Planning Council, Hillsboro County Board of County Commissioners, and Southwest Florida Water Management District. Mr. Gipson made presentations to the Environmental Protection Agency and Southwest Florida Water Management District in support of the project for Gardinier, Inc. He attended meetings with the Tampa Bay Regional Planning Council and provided testimony for the Hillsborough County Board of County Commissioners in meetings attended by over 1,500 people. Project permitting was delayed during a two-year period due to the arrest of three of the five members of the Hillsborough County Board of County Commissioners for accepting bribes. All necessary permits for the project were obtained, and the project is in operation. For Gardinier, Inc., Tampa, Florida.
- **238-Acre Gypsum Field, Tampa, Florida, USA** – The planned field included a lined base, extensive internal drains, and a leachate detection and collection system. The ultimate height was to be about 200 feet. Mr. Gipson directed geotechnical and hydrological services for the proposed field, including extensive field and laboratory work; evaluation of surface depressions (possible sinkholes), subsurface soil and water conditions; seepage control, and monitoring procedures; as well as slope stability and seepage analysis. For Gardinier, Inc.
- **116-Acre Gypsum Field, Tampa, Florida, USA** – Gypsum was planned to be deposited hydraulically behind a small starter dam using a peripheral pipe system, and subsequent raises made using the sedimented gypsum near the perimeter. The design included a lined base, extensive internal drains, and a leachate detection and collection system. The gypsum field is to reach a planned height of about 200 feet.

Mr. Gipson directed geotechnical and hydrological services for the proposed field, including extensive field and laboratory work; evaluation of surface depressions (karst limestone), subsurface soil and water conditions; a study of seepage control and monitoring system alternatives, stability and seepage analyses. The planned site was eliminated from consideration after investigations indicated that the continuity of the clay layer beneath the site had been compromised by “sinkhole” activity in the underlying karst limestone. For Gardinier, Inc.

- **Gypsum Disposal Fields 2 and 3, Pasadena, Texas, USA** – Mr. Gipson directed geotechnical investigations including extensive field and laboratory work to evaluate the stability to the existing fields and recommend procedures for raises to Field No.3. The facility was founded on high plasticity clays. The recommendations include provisions for a sub drain system. For Olin Corporation.
- **Design Investigation for Raising Gypsum Fields, near Nichols, Florida, USA** – Investigations and design for revising operations on three existing gypsum fields. For Conserv.
- **Gypsum Stack Commissioning Consultation, USA** – Consultation on a gypsum field that experienced excessive seepage and localized foundation liquefaction during start-up. Client confidential.
- **Due Diligence Study near Bartow, Florida, USA** – Environmental and hazardous waste assessment of gypsum fields on W.R. Grace property for a potential buyer of the property. Client Confidential.
- **Slope Failure Consultation, South Central, USA** – Consultation on stability of a failed slope on a gypsum field. Client Confidential.
- **Alafia River Ship Channel, near Tampa, Florida, USA** – Geotechnical investigations, designs, plans and specifications, and construction observation services for a dredged spoil storage area to contain material from cleaning and deepening the channel. For Gardinier, Inc.
- **Phosphatic Clay Settling Areas, near Fort Meade, Florida, USA** – Investigations, resident engineering, and construction observation services for six phosphatic clay settling areas. Each settling area covered about one square mile of land. Perimeter dikes constructed of silty sand were up to 75 feet high. For Gardinier, Inc.
- **Gypsum Field Consultation, Israel** – Mr. Gipson was retained to provide an overview of the stability and operational aspects of the existing slurry deposited gypsum disposal and newly implemented dry stacking operations. Client Rotem Fertilizer.

#### Forensic Studies and Litigation Support

- **Summitville Heap Leach Pad, Colorado, USA** – Mr. Gipson was retained to provide litigation support related to a claim that the design and construction of the leach pad was not performed in accordance with commonly accepted design practice and the construction was not performed in accordance with the plans and technical specifications. The Owner was sued by the EPA and in turn filed suits against his design and construction team. Remediation costs were more than \$200,000,000. A detailed review of the design and construction documents by Mr. Gipson supported the refutation of the claim. For Washington Construction Company.
- **Telluride Airport Slope Failure, Colorado, USA** – The 80-foot-high slope for the runway failed and the material from the failure flowed downslope about 1500 feet across a State highway and destroyed a concrete plant and waste handling station on the valley floor at the toe of the slope. A claim for the damages was filed with USF&G. USF&G filed suits against the parties involved with the design and construction of the earth fill for the runway. A review of the geotechnical report, designs and construction by Mr. Gipson demonstrated that the airport designer had not followed the recommendations in the geotechnical report and thus the airport designer was at fault. The claim against USF&G was dismissed. For USF&G Insurance.
- **Rapid City Airport Expansion Construction, Rapid City, South Dakota, USA** – During construction, a number of differing site conditions were encountered by the earthworks contractor including the presence of oversize material in the borrow area that were not identified in the geotechnical investigation. The oversize material needed to be removed from the fill. That added additional cost to remove the oversize material from the fill to meet specification requirements. The cost to remove the materials was over and above the bid price. Mr. Gipson reviewed the related documents and prepared a report that supported the contractor's claim. The contractor prevailed in his claim.
- **Geomembrane Lined Process Water Pond** – Mr. Gipson provided consultation on the repair of a geomembrane lined pond with a height of about 75 feet and perimeter of about 2 kilometers. On first filling the pond leaked excessively. Initial attempts to reduce the leakage were unsuccessful. The liner and foundation were examined and a number of construction defects were found including rocks to half meter in size directly below the liner, a small landslide in the bedding material, liner placed directly on sharp angular bedrock immediately below portions of the liner and small sharp-edged stones that had punctured the liner. Well over 500 patches had been placed in attempts to reduce the initial seepage. To remedy the situation the existing geomembrane liner and out of specification bedding removed and replaced with material meeting the specification. The remedial construction has been completed and the pond partially filled. No significant leakage has been reported. Client and location confidential.
- **Douglas Dam, Fort Collins, Colorado, USA** – Emergency response to turbid seepage from Douglas Dam. The dam is located above Fort Collins a town of about 40,000 people. The dam was an old structure with a history of previous raises, replacements and repairs. The dam retained an 8,400 acre-foot reservoir. Seepage was located in the embankment above the toe and outlet at the maximum section. Emergency drawdown of the reservoir was undertaken with construction of a reverse filter over the seep to control material migration. The subsequent investigations found that the foundation for an old clay tile pipe outlet had not removed. The concrete foundation for the pipe had been founded on wooden piling driven into the soft clay foundation. A clean cobble layer

had been placed to support access for the outlet construction and had not been removed. The seepage noted on the downstream face had flowed through the cobbles beneath the dam and exited on the downstream face. The outlet foundation and cobble were removed as part of the reconstruction and a slurry cutoff wall constructed beneath the new dam to bedrock. For Windsor Irrigation and Ditch Company.

- **Tailing Dam, Colorado, USA** – The water pond on this 50-foot-high tailing pond was inadvertently allowed to fill to the point it abutted the relatively pervious dam. As a result, there was a large flow of water through the dam. The Owner attempted to stem the flow by dumping soil along the upstream face of the dam to no avail. Mr., Gipson was asked to examine the situation and offer an opinion on remedial action. First it was suggested that soil placement be discontinued as it was not reducing the flow. Secondly, since the flow was not removing material from the dam it was apparent that the flow was not affecting the integrity of the dam itself. Thus, the recommendation was made to lower the water pool to its design limits away from the face of the dam. Client confidential.

### Tailing Storage Facilities

- **Twin Creeks Mines, Juniper Tailing Facility Expansion, Nevada, USA** – In 1994 and 1995, Project Manager overseeing site investigations, water balance, conceptual and final design, and design report including QA/QC for expanding the capacity of an 8,000,000-ton gold tailing storage facility by 50,000,000 tons. The designs include consideration for expanding the tailing storage facility to 70,000,000 tons, ultimately covering about 570 acres. The facility includes subaerial tailing deposition and a maximum tailing production rate of 15,500 tons per day.  
From 1996 through 2001, Principal-in-Charge of developing alternative designs for either a ten-stage horizontal and vertical expansion of the tailing storage facility to a 97,000,000-ton capacity or an eight-stage vertical expansion of the tailing storage facility to a 53,000-ton capacity.
- **Quebrada Honda Tailing Storage Facility, Southern Peru** – Toquepala and Cuajone are two open-pit copper mines producing approximately 150,000 tonnes per day. Each facility uses the Quebrada Honda Tailing Storage Facility. Quebrada Honda is being constructed as an embankment dam using cycloned tailing placed in cells to construct the 4-km-long, 120-meter-high embankment to store 880,000,000 tons of tailing. A raise rate analysis for operations to use as a measure for construction progress, a seepage and stability analysis leading to the recommendation for construction of a drain beneath the downstream shell, and an audit for Raise 1 were performed. In conjunction with the raise rate analysis, hydrologic aspects of the project, the capacity of the launder-to-carry tailing from the expansion project, and consultation on cyclone performance and embankment construction were reviewed. Mr. Gipson was the Principal-in-Charge for this work. For Southern Peru Copper Corporation.
- **San Cristóbal Project, Tailing Storage Facility, Nor Lipez Province, Bolivia** – Principal-in-Charge for a siting study and conceptual designs for the tailing storage facility was undertaken including a site reconnaissance of potential tailing storage facility locations near two proposed mill sites. Only one site could be located that would be capable of storing all the 240,000,000 tons of tailing generated over the life of the project at a reasonable cost. This site was the preferred site because it was located in a playa lake with no natural outlet. A hydrologic characterization study of the dry lake area indicated that it was geologically and hydrologically unlikely that tailing or leachate from the tailing would be discharged outside the playa lake during or after tailing deposition at the site. A report on the hydrologic site characterization was prepared and submitted to the Bolivian government for review and comment. A favorable response was received regarding the selected site. A water balance model of the playa lake was used to demonstrate if and when it might be necessary to control water entering the playa lake or pump back water for conservation. For Apex Silver Mines Corporation.
- **Sukhaybarat Gold Mine, Saudi Arabia** – Site reconnaissance, geotechnical investigations, laboratory testing, analysis, conceptual design, and final report for evaluating alternatives for developing a synthetically lined tailing facility to control seepage for an 80,000-ounce-per-year gold mine. The lined facility was constructed on the existing tailing. For Saudi Company for Precious Metals.
- **Mayflower Tailing Dam, Climax, Colorado, USA** – Geotechnical investigations and design report for the 560-foot-high upstream method tailing dam. For Climax Molybdenum Company.
- **Iowa Gulch Tailing Dam, Leadville, Colorado, USA** – Emergency response to a clear water seep on the dam, which was about 100 feet high at the maximum section. The seep occurred near the toe where the dam was about 40 feet high. Reservoir drawdown commenced immediately. The seep was attributed to excessive clear water against the upstream face of the raise dike. For Asarco, Inc.
- **Planned Molybdenum Mine, Crested Butte, Colorado, USA** – Preliminary investigations and designs for a tailing dam for the proposed 400-foot-high molybdenum mining and milling operation near the facility. For AMAX Inc.



## Heap Leach Pads

- **Walter Creek Heap Leach Pad, Fairbanks, Alaska, USA** – Project Manager for the investigation, design, construction engineering and quality assurance/quality control (QA/QC) for an 800-foot-high, valley fill, heap leach pad with a 110-foot-high rockfill dam to retain an in-heap solution pond. For Fairbanks Gold Mining Inc.
- **Toquepala and Cuajone Copper Leaching and SX-EW Operations, Peru** – Project Manager for hydrologic and geotechnical design criteria and conceptual designs for the stormwater dam (over 30 meters in height), PLS, sediment and storm water ponds, and a 15.1 –million-tonne HDPE heap leach facility. For Southern Peru Copper Corp.
- **Toquepala SX/EW Project, Southern Peru** – For the initial Toquepala SX/EW project, Mr. Gipson was the responsible professional for providing geologic, hydrologic, and geotechnical investigations to develop design parameters and conceptual designs for the Toquepala and Totoral sediment, PLS, and storm water ponds. Knight Piésold provided consultation on grouting the PLS and storm water pond foundations. The Toquepala storm water dam has a height of 120 feet, crest length of 500 feet, and spillway cut into rock on the right abutment. Currently, the client is expanding the Toquepala SX/EW operations, and to support that expansion, Knight Piésold has performed geologic, hydrologic, and geotechnical investigations and prepared designs and technical specifications for construction of the 3,250 Sediment and PLS Pond and Northwest Sediment Pond. Resident engineering geologic services have been provided during construction of the grout curtain to provide technical input as to grout hole spacing, grouting interval, injection pressure, and grout mix. Part-time observation of the earthworks construction was also provided. For Southern Peru Copper Corporation.
- **Cuajone Heap Leach Facility, Southern Peru** – Work at the Cuajone facility included development of designs for a 15.1-million-tonne heap leach facility and associated PLS and storm water ponds. The design included a geologic reconnaissance, development of hydrologic design parameters, and geotechnical investigations. Foundation design criteria were also developed for primary and secondary crushers, an ore stockpile, a 200-tonne storage bin, and an agglomerator product stockpile. For Southern Peru Copper Corporation.
- **No. 3 Copper Leach Dump, Tyrone, New Mexico, USA** – Geotechnical investigations and construction observation for expansion of a lined heap leach facility. For Phelps Dodge Corporation.
- **Sipán Heap Leach Project, Phase 2 Expansion, near Pampa Cuyoc, Peru** – Project Manager for design of an 80 meter-high heap leach pad with lined surface area of 143,000 square meters. The site is located at an elevation of 3,500 meters. For Compañía Minera Sipán, S.A.

## Water Storage Dams

- **Conga Project, Peru** – Project Director for investigations and designs for two water storage dams and two sediment control dams. One of the sediment control dams and one of the water storage dams were constructed during this period. Both were constructed during the wet season. The water storage dam was designed with an earthen core on the upstream face underlain by a cutoff trench beneath the upstream toe. Soils planned for use in the core were too wet to compact to the specified density. After taking considerable effort to process and place a few lifts of compacted fill in the bottom of the cutoff trench the design was changed to replace the earthen core with an 80 mil HDPE. The design change proved effective and the construction was completed on schedule and under budget. For Minera Yanacocha.
- **Clear Creek Project, Jefferson County, Colorado, USA** – Engineering geologic evaluations, geotechnical analyses, and site selection for water storage and hydropower project. Six concrete arch, ten gravity concrete and ten earth or rockfill dams to heights of 560 feet high were considered along with underground power house and associated tunnels. For Colorado Water and Power Development Authority.
- **Clinton Gulch Dam, near Climax, Colorado, USA** – Field investigations, laboratory testing, analysis, design, plans, and specifications for the 170-foot high rockfill dam. For Climax Molybdenum Company.
- **Halligan Reservoir Expansion, City of Fort Collins, Colorado, USA** – Engineering and environmental feasibility evaluation to expand Halligan Reservoir from 6,400 acre-feet to 15,000, 25,000 or 40,000 acre-feet. Three locations were considered for roller-compacted concrete, concrete arch, or earth-rockfill dams at dam heights ranging from 100 to 180 feet. The work included designs and cost estimates for 27 options. For the City of Fort Collins.
- **Button Rock Dam, Longmont, Colorado, USA** – Geologic and engineering feasibility evaluation for raising a 210 foot-high earth-rock dam to heights of 250, 280, 310, or 340 feet. Earth-rock and roller- compacted concrete saddle dams to 130 feet were considered. Work included designs and cost estimates. For the City of Longmont.

- **Stagecoach Dam near Steamboat Springs, Colorado, USA** – Technical assistance for investigations and designs of a 150-foot-high roller- compacted concrete dam impounding 33,000 acre-feet of water. For Upper Tampa Water Conservancy District.
- **Upper Gunnison-Uncompahgre Basin, Colorado, USA** – Engineering geology and geotechnical engineering feasibility study multi-use water project including recreation, irrigated agriculture, livestock production, and municipal and industrial uses. The study considered 28 dam and reservoir sites. For Colorado Water and Power Development Authority.
- **Douglas Dam, above Fort Collins, Colorado, USA** – Emergency response to turbid seepage from Douglas Dam, located above a town of 40,000. The dam is an old structure with a history of previous raises and repairs. The dam retained an 8,400 acre-foot reservoir. The seepage was located in the embankment above the toe and outlet at the maximum section. Emergency drawdown of the reservoir was undertaken with construction of a reverse filter over the seep to control material migration. Investigations and analyses indicated the integrity of the structure in the vicinity of the outlet works of the maximum section was questionable, and it was decided to remove and replace the dam.
- **Soda Lakes Dams, near Morrison, Colorado, USA** – Safety evaluations for dams that are earth-fill structures. The work included field investigations and analyses to evaluate embankment stability and make recommendations for upgrading the spillway for the upper dam. For the Denver Water Board.
- **Las Campanas West Course Lakes, New Mexico, USA** – Geotechnical investigation, hydrologic analysis, and design for surface-water diversion structures and one soil-lined and four synthetically-lined lakes for use in irrigation of the fairways, greens, and tees of the west course. Three of the lake embankments are cross-valley embankments; two surround the perimeter of the lakes. The surface water diversion structures consist of culverts and open channels designed for 100-year/24-hour precipitation events. For Las Campanas Limited Partnership.

#### Hazardous Waste and Lined Ponds

- **San Cristóbal Project, Solid Waste Storage Facilities, San Cristóbal, Bolivia** – Mr. Gipson was the Principal-in-Charge for investigations and designs for development of waste storage facilities for the mine operations. The project requires storage for approximately 12,600 cubic meters (m<sup>3</sup>) of conventional solid waste, 5,500 m<sup>3</sup> of dangerous solid waste, and 109,500 m<sup>3</sup> construction, salvage, and plant demolition. Knight Piésold was retained by Minera San Cristóbal to provide a characterization of the waste, develop final designs, plans, and technical specifications for construction of the waste storage facilities.  
As part of the work, Knight Piésold conducted a site investigation within the locality of the proposed storage facilities to evaluate the geologic, hydrologic, and geotechnical conditions of the site. The site investigation provided information to develop the geotechnical parameters and define the physical properties of the near-surface materials.  
The conformance to the regulatory standards for solid and dangerous waste disposal according to Bolivian Regulations, Bolivian Environmental laws (Reglamentos a la Ley de Medio Ambiente), the Estudio de Evaluación de Impacto Ambiental, World Bank, and International Finance Corporation standards were followed during the siting, data acquisition, and design the waste storage facilities. For Apex Silver Mines Corporation.
- **Porta Bella Redevelopment Project, Santa Clarita, California, USA** – Mr. Gipson is the Principal-in-Charge for providing owner representative services and contractor oversight in the development of the Porta Bella site located on 1,000 rolling acres in Santa Clarita, Los Angeles County, California. The site is the former Whittaker-Bermite Facility that manufactured and tested explosives, munitions, and solid rocket fuels from the early 1900s until 1987 when the facility ceased operations.  
Chemicals of potential concern associated with the site include ammonium perchlorate, a solid rocket fuel oxidizer, nitroaromatic (explosive) compounds, organic solvents, and various metal compounds. Unexploded ordinance clearance is also being addressed. Remediation of the site is being conducted in accordance with California EPA, Department of Toxic Substances Control (DTSC) procedures and standards to allow future commercial and residential development.  
To expedite the DTSC approval process, the site has been divided into manageable operable units based on watershed flow for site investigations and remedial actions. As each operable unit is remediated and certified as “clean” by the DTSC, the entire operable unit will be developed in accordance with the Master Plan approved by the City of Santa Clarita. The Master Plan includes single and multiple residential units, business park development, light industrial development, open space, schools and recreational areas, and several roads connecting to adjacent major streets and highways. For Remediation Financial, Inc.
- **Client Confidential** – Investigations and designs for a double-lined 6,000,000-gallon pond to collect acidic pregnant fluid from a copper leach operation. The lining system included 80-mil HDPE primary and secondary linings separated by an HDPE geodrain.
- **Bio-Ecology Site, Texas, USA** – Review of remediation designs, plans, and specifications for a double-lined hazardous waste landfill with a leachate collection and detection system. For Texas Department of Water Resources.



- **Wastewater Retention Pond, Tampa Florida, USA** – Investigations, design construction observation, and QA/QC for a 238-acre-lined pond designed to contain water with a pH of 1.5 to 2.0. For Gardinier, Inc.
- **California Gulch Superfund Site, Leadville, Colorado, USA** – Between 1992 and 1993, consultation services were provided to Asarco, Inc. related to mine wastepile stabilization and reclamation. The work included stability analyses, capping designs, and runoff and stream diversion. Overall responsibility included negotiations with the EPA for establishing acceptance of work on completed operation units. For Asarco, Inc.
- **Hazardous Waste Landfill, Texas, USA** – In 1982, a double-lined landfill was being designed for containment of hazardous waste. The cell included primary and secondary HDPE liners with a leachate collection and removal system. The ultimate facility included a cap. Provided senior review of the designs for the hazardous closure facility. For Bio-Ecology Superfund Site, Texas.
- **Cyanide and Mercury Cleanup Alternatives** – Served as Principal-in-Charge for the evaluation of a cyanide and mercury plume emanating from a tailing storage facility located in an arid climate. The work involved a review of previous work by others and evaluation of cleanup alternatives. For Confidential Client.
- **Evaluation of Remedial Measures** – In 1997, Mr. Gipson was responsible for the evaluation of remedial measures to collect and pump or treat PLS flowing in an alluvial channel under land in relatively impervious bedrock. The study included methods to intercept and collect seepage as well as pump seepage back to the operations or, alternatively, treat the seepage with a passive treatment system for release. For Confidential Client.
- **Dioxin Remediation, New Jersey, USA** – Responsible for oversight of the project manager who was responsible for the development of a 17-volume work plan for the remediation of a dioxin-contaminated site in New Jersey. The work plan development budget was approximately \$5 million. For Confidential Client.
- **Radioactive Site Cleanup, Pennsylvania, USA** – Responsible for the oversight of capping a radioactive site. The radioactive waste was created from a processing plant in Washington Bottoms. Because of the explosive nature of the materials, the waste was capped in place. Oversight of the borrow materials and QA/QC during the construction process were performed. The construction costs of the project totaled approximately \$3 million. For Amax.
- **Hazardous Waste Management, Ohio, USA** – Provided project management oversight for remediation of a hazardous waste site on the Lake Erie shoreline. This project was approximately \$5 million in construction costs. The project included management of budgets, schedules, and personnel.

### Reclamation/Closure

- **Keystone Mine near Crested Butte, Colorado, USA** – Investigations, analysis, design, plans, and specifications, resident engineering, and construction observation services including QA/QC testing for a buttressing fill and related drainage diversion to stabilize four existing tailing dams. The design included a collection system and lined pond to collect acid mine drainage from the mine workings and tailing dams for treatment to remove heavy metals and neutralize the pH prior to release. For AMAX Inc.
- **Big Springs Mine Heap Leach Pad and Tailing Storage Facility Reclamation, Northeastern Nevada, USA** – Principal-in-Charge for design and QA/QC for the closure of this gold processing facility in northeastern Nevada. Two major aspects of the closure involved developing grading and cover system designs and specifications for the heap leach and tailing storage facilities. Plans were selected based on the results of hydrologic modeling and cost analyses of several alternatives. The project also developed a general site-grading plan, performed a stability analysis, and completed designs for short-term sediment control structures.

For the tailing storage facility reclamation, the selected grading plan included using primarily tailing in a general balanced cut/fill approach. The constructability of the plan was confirmed by conducting tests that included excavating and characterizing tailing at depth within the facility and completing two test pads. The overall grading plan incorporated an overbuild design for areas where fill material would be placed. The balanced cut/fill approach resulted in significant cost reductions compared to approaches that would use only fill materials to create the desired grade. For AngloGold (Jerritt Canyon) Corp.

### Geotechnical Investigations

- **Hidalgo Copper Smelter near Lordsburg, New Mexico, USA** – Geotechnical investigations, laboratory testing, analysis, report preparation for use in site selection for the Hidalgo Copper Smelter. Two sites were evaluated and compared on the basis of foundation conditions. For Phelps Dodge Corporation.
- **Tyrone Mine, New Mexico, USA** – Geotechnical investigations and construction observation services for expansion of the SX-EW facility including founding the facilities on highly variable foundations from granite on one hand to about 50 feet of waste rock fill on the other. For Phelps Dodge Corporation.

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- **Island Copper Mine near Port Hardy, British Columbia, Canada** – Geotechnical investigations and designs for a 3,000-foot-long slurry wall cutoff through open-work mine rock dump for expansion of the open pit copper mine.
- **Colorado Ute Power Company near Craig, Colorado, USA** – Geotechnical investigations to evaluate a landslide in a clay shale cut slope and to develop design criteria for remedial measures for a power station.
- **Comanche Stream Electric Generating Station, Pueblo, Colorado, USA** – Identification of bearing materials for foundation and monitoring earthwork contractor's performance for conformance with plans and specifications for the Comanche Steam Electric Generating Station and appurtenant structures. For Public Service Company.

## WORK HISTORY

Knight Piésold and Co., Denver, Co., Senior Consultant and Project Director, 1993 to 2001 and 2003 - Present

Consulting Engineer, Denver, CO, 2002

Woodward-Clyde Consultants, Vice President, 1970 - 1993

## PUBLICATIONS AND PRESENTATIONS

Gipson, Jr., A.H., 2000, "E-Technology Revolutionizes Environmental and Engineering Services for the Owner," Presented at the Forbes Magazine E-Business in the Construction Industry Conference, Washington, D.C., December 14-15.

Gipson, Jr., A.H., 2000, "Tailing Dams Defined, Described and Compared to Water Dams," Tailing Dams 2000, a Joint ASDSO/USCOLD Specialty Conference, Las Vegas, Nevada, March.

Gipson, Jr., A.H., 1998, "Tailing Disposal – The last 10 years and future trends," Tailing and Mine Waste '98, The Fifth International Conference on Tailings and Mine Waste, Fort Collins, Colorado, January.

Gipson, Jr., A.H., and J.G. Deschamps, 1996, "Soil Box Able to Test 700-Foot Heap Leach Heights," Randol Gold Forum, Olympic Valley, California, April 21-24.

Wildeman, T.J., J.J. Gusek, A.H. Gipson, Jr., and G. McClelland, 1995, "Planning and Design Concepts for Mine/Mill Closure," Two-day Short Course Presented at 1995 Annual Meeting, Society for Mining, Metallurgy and Exploration, Denver, Colorado, March 4-5.

Gipson, Jr., A.H., 1993, "Keystone Mine Tailing Dam Reclamation," Presentation at the Air and Waste Management Association Annual Meeting, Denver, Colorado, June.

Gipson, Jr., A.H., 1993, "Engineering Geology for Dams," Short Course at the Association of State Dam Safety Officials Annual Meeting, Breckenridge, Colorado, May.

Gipson, Jr., A.H., 1992, "Timely Response Averts Disaster: Douglas Dam and Spillway Rehabilitation," Presentation at Association of State Dam Safety Officials Meeting, Baltimore, Maryland.

Gipson, Jr., A.H., 1990, "Seepage Design Considerations," Technical Seminars on Seepage in Dam Safety Evaluation and Remediation in Jackson, Wyoming, and Kalamazoo, Michigan, Sponsored by Association of State Dam Safety Officials and Federal Emergency Management Agency.

Gipson, Jr., A.H., 1990, "Investigation, Design and Permitting of a 326-Acre Phospho-gypsum Field," Presentation at American Society of Civil Engineers, Geotechnical Section, Denver, Colorado.

Gipson, Jr., A.H., 1985, "Permeability Testing on Clayey Soil and Silty Sand-bentonite Mixture using Acid Liquor," Hydraulic Barriers in Soil and Rock, American Society for Testing and Materials, STP 874, September.

Gipson, Jr., A.H., 1983, "Investigation, Design and Construction of Buttressing Fill for Failed Keystone Mine Tailing Dams," Presentation at American Society of Civil Engineers, Geotechnical Section, Denver, Colorado.

Gipson, Jr., A.H., 1981, "Design Considerations for Hazardous Waste Land Fills," Presentation at Seventeenth Annual Intermountain Minerals Conference, Vail, Colorado.

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Consulting Engineer

Gipson, Jr., A.H., 1979, "Phosphatic Clay Waste Storage Tailing Dams," Presentation at Woodward-Clyde Consultants Professional Development Seminar, Berkeley, California.

Gipson, Jr., A.H., 1979, "Pond Linings," Presentation at Woodward-Clyde Consultants Professional Development Seminar, Berkeley, California.

Gipson, Jr., A.H., 1970, "Controlled Rate of Strain Testing of Undisturbed Soil Samples," Master's Thesis, University of Kansas, Lawrence, Kansas.