



Adding value. Delivering results.



Knight Piésold
CONSULTING

Mining Services

Integrated engineering and environmental services to help you achieve more.



About Our Company

Knight Piésold is a global consulting firm that provides specialized services to the mining, power, water resources, infrastructure, and oil and gas industries. We are engineers, environmental scientists, geoscientists, and technologists who focus on creating value at every stage of a project through quality driven, sustainable solutions.

Established in 1921, we have a multidisciplinary team of talented professionals based in 27 offices across North and South America, Europe, Africa, Australia, and Asia. At Knight Piésold, we work as one team, mobilizing local and global resources to meet the needs of each client.

We work closely with our clients, understanding unique project characteristics within the context of today's global business environment. With a commitment to safety, quality, and technical excellence, Knight Piésold specializes in creating customized solutions at every stage of a project life cycle, while delivering sustainable, bottom-line results. We have led numerous award-winning projects to completion, and have fostered many longterm client relationships that hold strong today.

Project Locations:

Knight Piésold has been active in Perú, Chile, Brazil, Argentina, Mexico, Dominic Republic, Ecuador, United States, Canada, Australia, UK, South Africa, Botswana, Cameroon, Ethiopia, Eritrea, Ghana, Guinea, Burkina Faso, Mali, Mozambique, Malawi, Madagascar, Namibia, Zambia, Zimbabwe, Tanzania, Israel, Uganda, Rwanda, Nigeria, Sudan, Philippines, Indonesia, among others.



Practicing mining engineering for hundreds of surface and underground projects worldwide

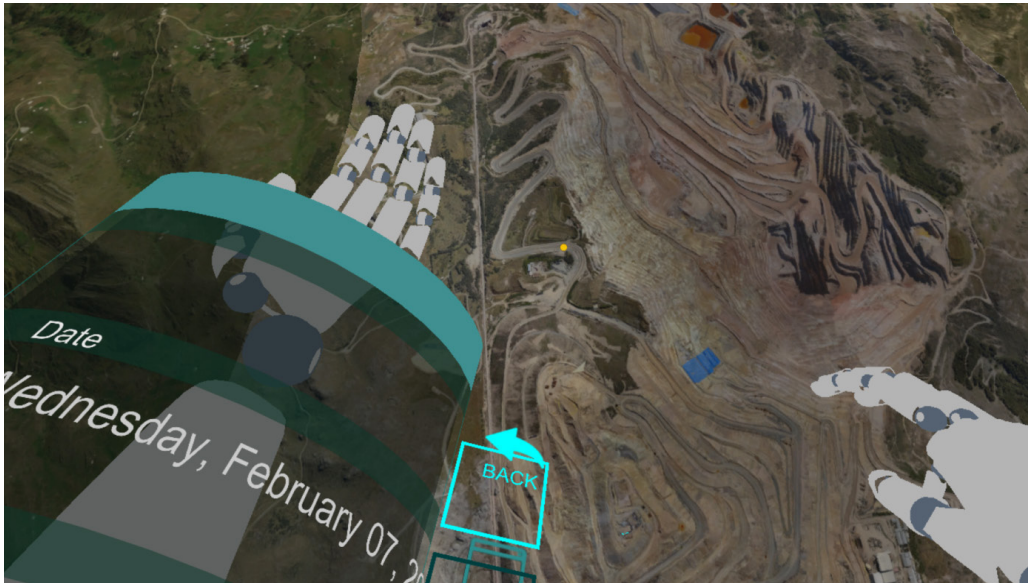
In the Mining sector, the name Knight Piésold has become synonymous with quality civil engineering, environmental science and construction support for mine infrastructure. Knight Piésold's mining expertise has been applied to hundreds of surface and underground mining projects worldwide, under a wide range of biophysical conditions. Our professionals work seamlessly together to build value for your project. We complete successful stakeholder engagement, environmental studies, and government liaison services built on innovative and cost-effective engineering solutions.

By providing quality and environmentally sound engineering and science, our clients in the international mining industry trust Knight Piésold to successfully move their projects forward through to completion. We work with the client team to identify and reduce risk throughout the project lifecycle. Knight Piésold adds value to projects through engineering to the highest environmental standard, conducting effective engagement of communities, indigenous peoples, and governments, and ensuring compliance with lending institutions. This approach increases efficiency, return on investment, and the reputational advantage of our clients' projects.

Engineering and environmental services at every stage of a mine's life cycle



The mining industry is constantly evolving and adapting in response to societal needs and advances in technology.



For decades, we have built a leading position in the research, design, and implementation of tailings and water management and heap leach systems, in addition to geotechnical design for open pit and underground mine developments. We provide specialized services at all project stages, from early exploration, through engineering and environmental studies and on to construction, operations, and closure.

The research, design and implementation of pioneering solutions to mining waste management (tailings) and heap leach systems, as well as specialist geotechnical investigations for mine developments, have positioned our company as the foremost leader in these fields. Projects include gold, platinum, nickel, phosphates, chrome, fluorspar, copper, cobalt, manganese, zinc, uranium, coal, diamond, graphite, gypsum, ash and heavy mineral sands mines. As a result, members of the company have extensive capabilities and experience in most aspects of mine infrastructure development and can therefore offer a full spectrum of services.

For all these reasons, Knight Piésold is widely known for its innovative solutions and efficient application of technology.

Our Services

Our mining expertise includes the following:

- Tailings Storage Facilities (TSF)
- Waste/Rock Dumps (WRF)
- Heap Leach Pads (HLP)
- Geotechnical Engineering
- Waste & Water Management (dams, ponds, etc.)
- Water Balance, Dam Break Analysis
- Waste Characterization and Geochemistry
- Mine Closure and Reclamation
- Environmental Baseline Studies
- Environmental Impact Assessment (EIAd – EIAsd)
- Rock mechanics for underground and open pit mines
- Air, Noise, Vibrations and Water Quality Modeling
- Environmental and Biological Monitoring
- Biodiversity Studies
- Renewable Energy Facilities
- Site Investigations and Laboratory
- Construction Quality Assurance (CQA)



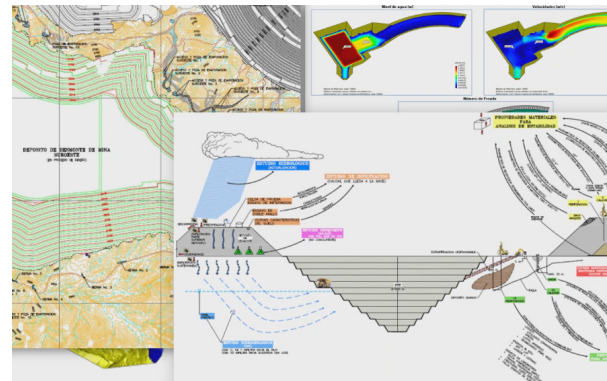
Tailings Storage Facilities (TSF)

We design and supervise the construction of all types of tailings management systems in every major mining district around the world. We have pioneered and advanced the development of alternative tailings management technologies, such as sub-aqueous systems, drained sub-aerial systems, paste tailings disposal, codisposal, comingling and dewatered filtered tailings systems. We provide complete and comprehensive design and operational expertise for tailings management tailored to the specific features of each site and the needs of each client.



Waste / Rock Dumps (WRF)

We have participated in the design of large-scale waste / rock dumps, taking into account comprehensive features, from geotechnical aspects and material characterization, to water management and geochemical aspects. Our designs fully comply with all the facilities required for these type of structures: placement of material, operation and monitoring.



Heap Leach Pads (HLP)

From relatively straight forward sites to those in physically and environmentally challenging locations, our experience in designing heap leach pads encompasses all locations and sizes and includes some of the largest heap leaching operations in the world. Expertise is provided in a variety of liner and solution collection systems, loading, and solution management strategies, including for high fines content ores and wet and cold regions applications.



Geotechnical Engineering

From site assessment through to construction supervision and QA/QC, we have extensive experience in the full spectrum of geotechnical services for mining projects. Geotechnical conditions of each project site are unique and our approach is to tailor the site investigations to the degree of complexity of the site and provide an appropriate level of planning and design for the requirements of each client.



Waste & Water Management

We have designed award-winning integrated waste and water management systems for mining projects. These systems involve a thorough understanding of the sitespecific hydrometeorology, surface water and groundwater hydrology, waste characteristics, environmental and permit limitations, and client preferred operational philosophies. Probabilistic modelling is commonly adopted to confirm that all extreme scenarios are identified and addressed in order to achieve sustainability objectives.





Water Balance, Dam Break Analysis

We have designed award-winning Integrated Water and Waste Management Systems for mining projects. These systems involve a profound understanding of site-specific hydrometeorology, surface and groundwater hydrology, waste characteristics, environmental and permit constraints, and client-preferred operational philosophies. Probabilistic modeling is commonly adopted to ensure that all extreme scenarios are identified and addressed to achieve sustainability goals.



Waste Characterization and Geochemistry

Our overall understanding of the critical components of a successful mine development allows us to develop optimized and environmentally safe operations. Our expertise in waste characterization, field and laboratory testing, numerical modelling, and the practical application of preventative strategies has been applied to numerous successful mining projects at various stages of development.



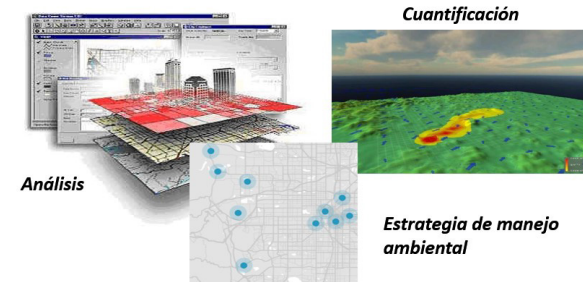
Mine Closure and Reclamation

Our integrated and multidisciplinary expertise in postoperational site security and risk management is used to develop closure plans for new and existing mining operations that are compatible with the surrounding environment, regulatory requirements, and cost efficiency considerations. Our engineering design and construction experience provides the expertise for accurate reclamation cost estimating and for establishing appropriate surety amounts.



Environmental Baseline Studies

These correspond to the characterization of the physical, biological, socio-economic, and cultural environments, with the purpose of determining the current state of the environment before the execution of an investment project, whether it is greenfield or brownfield. Knight Piésold's multidisciplinary team has the necessary capabilities to collect, process, and interpret field data in a way that enables its clients to make decisions with a sustainable focus.



Environmental Impact Assessment (EIA-d – EIA-sd)

At Knight Piésold, we have experience in preparing detailed Environmental Impact Assessments (EIA-d) and semi-detailed Environmental Impact Assessments (EIA-sd) across various industrial sectors. Our multidisciplinary team evaluates the interaction between investment project activities and various environmental factors to determine socio-environmental impacts and propose the most effective management measures, aiming to promote the sustainable development of our clients.

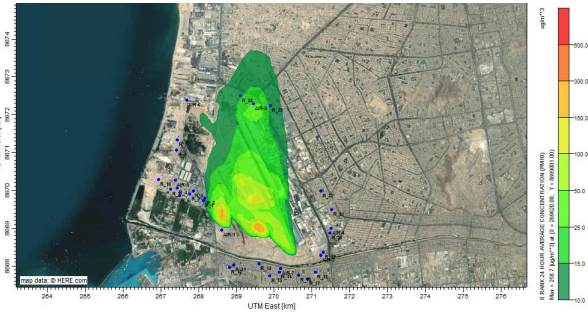


Rock mechanics for underground and open pit mines

We conduct geomechanical studies for the design of underground and open-pit excavations in mining and civil projects, including geomechanical mapping, geotechnical investigations using oriented drilling methods such as ACT Reflex or similar techniques, AQ Logger, Televiewer, and field and laboratory testing. Our design process involves analyzing kinematically credible failure modes based on structural arrangements and failure analysis based on rock mass quality. We employ integrated programs using limit equilibrium, probabilistic, and numerical methods (MDF and MEL) under the stress reduction factor methodology to optimize the configuration of bench, inter-ramp, and overall slopes.

Air, Noise, Vibrations and Water Quality Modeling

In order to assess impacts and propose more precise management measures, Knight Piésold has qualified specialists to develop environmental models, including air quality, noise, vibration, and water models. Obtaining quantitative results of the impacts reduces bias in their evaluation and enables decisions that promote environmental protection.



Environmental and Biological Monitoring

At Knight Piésold, we provide support in the execution of environmental and biological monitoring, which are integral to the environmental surveillance plan of our clients' environmental management instruments. Our team of engineers and scientists has extensive experience in collecting, processing, and interpreting the generated information to determine whether there are any deviations in the client's preventive environmental instruments and whether the implemented management measures are effective and efficient.



Biodiversity Studies

We conduct biodiversity studies of terrestrial and aquatic flora and fauna. These studies help us understand the number of species present in a specific geographic area and how they interact with each other and the environment. They also allow us to identify species that may be in need of conservation efforts, as well as endemic or restricted distribution species, which can aid in defining fragile ecosystems. To achieve this, we employ various field techniques and methodologies tailored to the study's objectives and the region's characteristics.



Renewable Energy Facilities

Knight Piésold offers a 'One-Stop-Shop' for Renewable Energy, encompassing assessment, design, field investigations, analysis, support during construction, operation, and closure. Our process begins with assessing the potential for renewable energy use, identifying solar, wind, and run-of-river energy resources near the mine. With over 100 years of experience, Knight Piésold has been involved in more than 400 hydropower projects worldwide, many of which have been for mining clients.



Site Investigations and Laboratory

A critical input for the design of mining infrastructure, such as dams, waste rock deposits, leach pads, plant foundations, and more, is geotechnical investigations and laboratory testing. In this regard, we offer investigation services that follow a standardized process proven effective in hundreds of projects. Additionally, we have an internationally certified geotechnical laboratory located in Lima.



Construction Quality Assurance (CQA)

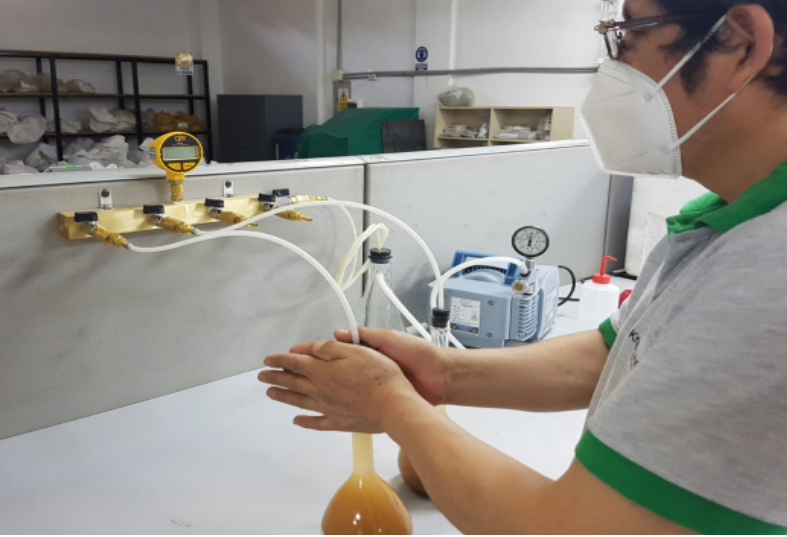
We have developed a Quality Management System (QMS) that allows our clients to certify that the construction of their structures has been executed to world-class quality standards. This QMS has been implemented for over 25 years in major mining projects in Peru, and its application has led to the issuance of operating permits for these structures by the authorities. Our Construction Quality Assurance (CQA) service covers various specialized disciplines, including the installation and use of geosynthetic materials, soil material composites, concrete, pipelines, and metal structures.





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Knight Piésold Peru Geotechnical Laboratory



Knight Piésold Consultores has been providing geotechnical testing services in Peru since the year 2000

At Knight Piésold Peru, we have a specialized laboratory based in Lima that delivers high-quality and timely results. Furthermore, we have experience in developing and managing field laboratories for quality control.

Our laboratory offers specialized testing services for soils, aggregates, and geosynthetic materials, utilizing trained and experienced technicians with extensive expertise in both field and laboratory geotechnical testing. Our engineers provide continuous oversight of all laboratory operations. Our standard testing procedures adhere to appropriate ASTM, AASHTO, and other international standards with stringent quality control.

Our experience in various mining projects, delivering materials on time and with quality, the skill of our technicians, and our experience in developing and managing field laboratories, provide a distinct advantage to ensure timely project completion.

Our key laboratory services include:

- Triaxial Tests (UU, CU, and CD)
- Flexible Wall Permeability
- Unidimensional Consolidation
- Dispersion Tests (Pin Hole, Crumb Test, and Double Hydrometer)"
- Index and Characterization Tests (including grain size analysis, consistency limits, density, specific gravity, Proctor maximum density, CBR, abrasion, among others)
- Tailings Characterization Tests

Our laboratory is accredited by INACAL-DA (results internationally recognized by IAF, IAAC, and ILAC) and is in compliance with the ISO/IEC 17025 standard



We are the first and only laboratory in Peru to have accreditation for specialized tests (triaxial, consolidation, etc.).



Knight Piésold Peru's geotechnical laboratory has successfully achieved accreditation from the National Institute of Quality (INACAL). The Accreditation Directorate (DAC) of INACAL has authorized the laboratory to conduct testing activities and has certified that the results issued by the laboratory are accurate and reliable, based on the criteria and procedures applied to assess and maintain technical competence.

INACAL is the national governing body for matters related to quality, including technical standardization, accreditation, and metrology. INACAL is a signatory to the Multilateral Recognition Agreement with the International Accreditation Forum (IAF) and the Inter-American Accreditation Cooperation (IAAC), as well as the Mutual Recognition Agreement with the International Laboratory Accreditation Cooperation (ILAC). As a signatory, test results issued under INACAL's accreditation are recognized by all international member signatories.

The accreditation process required KP Peru to enhance its infrastructure, update its knowledge of testing methods, and implement a quality management system based on ISO/IEC 17025 standards. The process concluded with an audit by DAC technicians and evaluators.

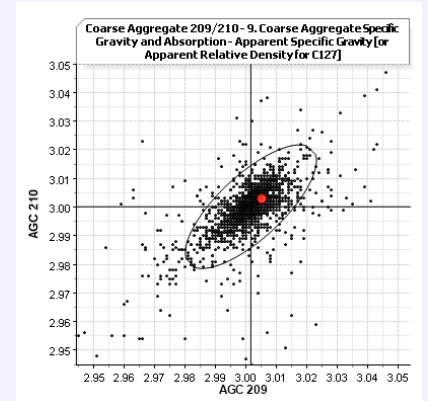
"This achievement illustrates the remarkable effort our team has put forth in recent years to elevate the technical competence of our laboratory to national and international standards," said Guillermo Barreda, General Manager of KP Peru. "We are continuously improving and expanding our capabilities to provide state-of-the-art testing services, in addition to delivering high-quality environmental and engineering services at every stage of a project for our clients."

Our advantages

Our laboratory experience delivers the following benefits:

➔ Assurance of Result Validity

- Ongoing Assessment of the Laboratory's Technical Performance.
- Metrological Control of Equipment, including calibrations with recognized entities.
- Participation in Proficiency Testing Programs.



➔ Reliable Results

➔ Informes de resultados con reconocimiento internacional

➔ Results Reports with International Recognition

➔ Our laboratory leader is a certified instructor by ASTM International and a technical expert in testing laboratories.



➔ Extensive Sample Handling Capacity.



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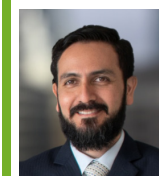


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