INTRODUCTION

Since the founding of Pincock, Allen & Holt (PAH) in 1968, much of the consulting work undertaken has involved acting as an independent engineer for the due-diligence review of mining projects. The majority of this work has been for financial institutions contemplating the lending of funds for new or expanding mine projects. In addition, a significant amount of due-diligence work has been carried out for firms sponsoring or underwriting public offerings, mergers, and acquisitions. PAH has completed due-diligence reviews for mining projects in the major mineral provinces of the world and for a wide spectrum of commodities.

In many project-finance cases, PAH has provided assistance and advice to the lending institutions by developing reasonable project-completion covenants. In these cases, PAH has always kept in mind that the lender must be protected, while the borrower (usually a mining company) must be able to reasonably complete construction and satisfy physical- and production-completion requirements. As a truly independent participant, PAH frequently becomes a facilitator for major mining projects by bridging the gap between the financial and operating entities. By working with both sides, PAH can help keep small problems small and flag large problems so they can be addressed early in project development.

DUE-DILIGENCE PROCESS

The due-diligence process for a new or expanding mine project normally involves the review of a bankable-level feasibility study which has been prepared by a mining company, a mineral-engineering company, or alternatively a mining company working in concert with a mineral-engineering company. This work is carried out under the direction of a project manager selected from the ranks of PAH’s most senior and experienced professionals. Reporting to the project manager will be a multi-disciplinary review team consisting of PAH professionals selected with a focus on matching specific backgrounds and experience to the particular project to be reviewed.

Completeness Review

The first step in a due-diligence review is to ensure that all the major elements normally associated with mine project feasibility work are fully addressed. These elements are:

- Geology and Resource Estimate
- Mining and Reserve Estimate
- Processing
- Environmental Evaluation and Permitting
- Infrastructure and Administration
- Project Schedule
- Economics
Site Visit

The next step in the due-diligence process usually consists of a site visit. In the case of a grassroots project, the site-visit team will generally include a geologist, a mining engineer, and an environmental specialist. A process engineer will normally arrange a visit to the metallurgical laboratory where the testwork has been carried out. In the case of an ongoing mining operation, the process engineer would normally be part of the site-visit team.

During the site visit, the technical team will review local infrastructure, carry out a general inspection of the property, examine exploratory drifts and available core, check for adequacy and review sampling methods (geologic, metallurgical, geotechnical, etc.), and collect all relevant data. It is always desirable for the diligence-review team to meet with the sponsoring company’s technical team during or shortly after the site visit.

Technical Review

After the site visit, the team will return to its home office and carry out a technical review. This review will confirm that the level of engineering and accuracy of cost estimates are consistent with feasibility ("bankable") requirements.

- **Geology and Resource Estimate**

  Sound geological interpretation and appropriate sampling are the foundations of a successful mining project. Geological and geostatistical methodology, assumptions, and resource calculations will be reviewed, and requisite statistical checks will be performed.

- **Mining and Reserve Estimate**

  Project economics will be reviewed to determine that appropriate cutoff grades have been calculated in the preparation of the mine plan and reserve estimate. Opinions will be developed as to the suitability of the proposed mining method, equipment selection, and capital- and operating-cost forecasts. Mine plans will be reviewed to confirm that the production schedule is feasible and accurately reflected in the cash flow.

- **Process Plant Engineering and Construction**

  Metallurgical testwork, mass balances, reagent requirements, plant flowsheet and process design, recovery estimates, plant construction and operation, as well as forecast capital and operating costs will be reviewed.

- **Geotechnical and Hydrological Engineering**

  Geotechnical investigations and designs for mine and plant construction; mine-waste design including tailings-dam structures, heap-leach pads, impoundments and waste rock disposal areas; and overall water-balance requirements will be reviewed for conformance with appropriate design standards.
An Essential Part of Project Finance

- **Environment and Permitting**

The status of environmental baseline work will be reviewed including assumptions and permit status. In addition, PAH will determine if the environmental considerations are consistent with the client’s needs and corporate objectives (i.e., North American as well as international standards) and ensure that all permits required by the appropriate authorities are in place or can be put in place in a timely manner with reasonable conditions.

- **Infrastructure and Administration**

Mine and plant infrastructure will be reviewed to determine if necessary services such as communications, fire control, industrial and potable water, power, roads, safety and medical facilities, security, and sewage treatment are adequate and that capital and operating costs reflect these services. Mine and plant administrative, supervisory and technical personnel, and organization structure will be reviewed. General and administrative costs will be checked. Additional proposed facilities such as maintenance shops, warehouses, employee housing, camp facilities, and explosive storage will be assessed.

- **Logistics and Constructability**

Many mining projects are being built in remote locations in developing countries. Whether the site is in the frozen tundra of Far East Russia or the jungles of Indonesia, the logistics and constructability of new projects require careful scrutiny to make certain that project scheduling and capital allotments are adequate.

- **Economic Analysis**

The detailed cash-flow analysis prepared by the owners or client will be reviewed or, alternatively, an independent cash-flow analysis will be prepared. Should it be necessary, revisions in the cash-flow and sensitivity studies will be completed to represent alternative scenarios requested by the client.

- **Report Preparation**

A professional technical due-diligence report will be prepared at the conclusion of the work. The report will summarize all the results and work done including data, pertinent assumptions, and methodologies used. Risks and concerns regarding the project will be clearly identified and quantified where possible.

**PROJECT COMPLETION**

Under a true project-finance scenario, lending institutions universally include project completion covenants as part of their loan agreements. Completion requirements under these covenants typically focus separately on 1) physical and/or mechanical completion followed by 2) the performance and/or production completion. Lending institutions frequently request assistance in defining these covenants with specific and measurable requirements. In addition, a client may request a review of proposed engineering and construction contracts at this time.
Construction Monitoring

The role of the independent engineer during the construction period depends on the complexity of the project and the needs of the financing entity. Typically, an independent engineer is retained to monitor construction progress to ensure that construction keeps pace with the capital outlays and that construction matches the feasibility study or accepted development plan. Any revisions to the approved plan are generally reviewed and approved by the independent engineer before implementation. Construction-related reports are reviewed monthly and periodic site trips are a common requirement.

Physical or Mechanical Completion

Physical or mechanical completion occurs when all infrastructure is in place, the mine is developed to a point where it can produce ore on a continuous basis at the required tonnage and grade, and the process plant is built to design specifications. Typically, the independent engineer will verify that the major components are in place, operational, and consistent with the development plan approved by the financial institution.

Performance or Production Completion

A typical performance or production completion test is performed over a 90- to 180-day period depending on the covenants of the loan agreement. During the test period, the mine and process plant must operate at agreed-upon minimum capacities, ore grades, and recoveries, with unit costs and consumption rates not exceeding agreed-upon levels. Often completion requirements include performance tests of major process circuits such as crushers, grinding mills, conveyors, and flotation cells as well as the reconciliation of ore produced against the geologic model used in the feasibility study.

Monitoring of the production test period by the independent consultant requires close cooperation with the sponsor company. As with the physical completion test, once the production test is successfully completed, an appropriate certification document will be executed.

Production Monitoring

It is not uncommon for the independent engineer to monitor project operations until completion of the payback of the loan. This work may include a review of monthly reports and annual site visits.

CONCLUSION

PAH, with its staff of full-time senior mining professionals in all relevant technical disciplines, has earned a reputation within the international financial community for providing reliable independent technical assistance in project finance. For more information about our services or if you have a project you would like to discuss, our mining managers and specialists are available at the locations shown below.

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**Representatives in:** Vancouver; Lima; La Paz; Rio de Janeiro; and Santiago

**Denver:** (303) 986-6950  
**Seattle:** (206) 324-9530

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Pincock, Allen & Holt (PAH) is a consulting and engineering firm serving the international mineral resource industry. This information bulletin is published as a free information service for friends and clients. Your comments and suggestions are always welcome. Contact Pincock, Allen & Holt; 274 Union Boulevard, Suite 200, Lakewood, Colorado 80228; 303/986-6950; FAX 303/987-8907;  
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