Project Management International

Borehole Drilling with Standard Penetration Tests and Cone Penetration Testing at Bogoso Mine

Client: Knight Piesold Ghana Limited
Location: Bogoso Mine - Ghana
Period: October to November 2010

Borehole Drilling with Standard Penetration Tests and Cone Penetration Testing

Knight Piésold Geotechnical Consulting Engineers were tasked with evaluating the embankment raising options for a second tailings storage facility at the Golden Star Resources Mine at Bogoso.

In order to evaluate the options available for raising the facility and to gain the Environmental Protection Agency's approval, Knight Piésold requested that a site investigation campaign consisting of boreholes with Standard Penetration Tests (SPTs) and Cone Penetration Tests (CPTs), be conducted. The tests were carried out at various locations- on the embankment crest, on the tailings and on natural ground at the downstream toe of the embankment.

Scope of Works

The scope of works comprised the following:

- Drilling of 13 boreholes, with soil sampling.
- Execution of SPTs at 2m intervals for every borehole drilled, where possible.
- Grouting of all holes drilled on the embankment crest.
- 10 CPTs to a maximum depth of 14m, or refusal.
- Soil sampling at the CPT locations.

Execution of Works:

Boreholes with SPT

13 boreholes were drilled at various locations as indicated by the Client. The boreholes were drilled to depths varying between 3m and 10m, dependent on the Client's specifications. SPTs were conducted at 2m intervals, conditions permitting.

The boreholes were drilled by a Dando Terrier drill rig using percussion drilling methods. Holes were located on the embankment, on dried tailings, and on natural ground at the downstream toe of the embankment.

Continuous soil samples were collected in transparent sampling tubes for inspection and logging on site by a Geotechnical Engineer.

Cone Penetration Testing

10 CPTs were carried out at complimentary locations on the embankment, dry tailings, and on natural ground at the toe of the downstream embankment.

A 200KN Geomil penetrometer mounted on a steel skid was used to carry out the tests. The penetrometer employs an electronic Piezocone to log the cone resistance, sleeve friction, dynamic pore water pressure and hole inclination during penetration. Specialised software processes the electronic information to present geotechnical properties of the soils probed. Detailed CPT logs, including some interpretation, are generated for the client.

For testing on the relatively soft dry tailings, a platform of laterite fill was prepared in advance to receive and support the CPT rig.

Conclusion

PMI successfully carried out the site investigation campaign, to specification and within budget.