



Executive Summary

Western Engineering and Surveying Services was contracted to act as the prime consultant to determine ore quantities located under the Orykta[®] Lyon County Nevada Claims.

As this quantity would play a key role in determining the mine's worth, all work on this project was performed with the highest degree of accuracy attainable within the engineering and surveying fields today. Due to the extensive nature of the mapping and degree of accuracy demanded, this project has taken three months to complete.

We have sub contracted technical work to two independent firms in order to complete this project. North American Aerial Mapping's (NAM) Sparks' Nevada office to provide aerial photogrammetry mapping services. And, Earthwork Quantities of Reno, Nevada to provide computer aided volumetric iterations.

Our final calculations show that 938,522,358 cubic yards of ore lay beneath the Orykta[®] mine's 49 claims within the study site.

The following report provides a narrative of methods used in and the results of our analysis.

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Introduction

Estimation of earthwork quantities in the engineering and surveying field today, makes extensive use of field survey, aerial photogrammetry, coordinate geometry, computer aided drafting, and iterative mathematics. The following sections provide a brief description of each step in the process of determining earthwork quantities.

Field Survey

Once a site has been identified the aerial mapping company is given a map of the general area identifying the site. The mapping company will provide surveyors with a map depicting locations along the project boundary and surrounding section corners which will require setting 'known points (targets). Targets are physically painted on ground or marked with white (ny) on X's large enough to be identified by aircraft. Each target is then surveyed to establish its exact elevation, latitude and longitude.

This project required 12 targets to be set over an area of 3 square miles. Due to the rugged terrain and remoteness of the site, numerous trips to the project site over a one month period were required. Also, research of original survey records at the Bureau of Land Management Offices was required in order to establish known control points within the area.

Aerial Photogrammetry

After targets have been set, the site is photographed from the air. A series of photographs called a strip mosaic is taken. These photos are taken with a 11 overlap of approximately 25%. This overlap will allow for the relief or topographic features to be plotted from the photographs.

Once developed, photos are used to create a topographic map employing stereoscopic and digital terrain modeling techniques. NAM technicians informed our office that this was the largest topographic map (digital file size) that they had produced in their company. This was due to the large area and mountainous terrain and high degree accuracy (2' contour interval) required. As a comparison, topographic maps created in mountainous areas with terrain similar to this site are typically produced with 40' contour intervals. Therefore, twenty times the normal amount of contour lines were required for this map.

Vertical accuracy of this map is accepted to be plus or minus one half contour interval (1'), meaning that for any contour on the map, 90% of true ground elevations will be within one foot of the given contour elevation. Horizontal accuracy is accepted as plus or minus one quarter of a contour interval (6").

Coordinated Geometry

Using coordinate geometry and CAD digitizing techniques, a map of recorded claims, provided by the company, is superimposed on the topographic map.

Coordinate geometry refers to locating points on a drawing in the "real world". Each point on a drawing is assigned a northing and an easting value. These values refer to distances north and east of a known location. In this way we have assured that the claims are laid on the map in correct positions. Once claims have been located the topographic map, volumes can be calculated.

Volumetric Calculations

Volumetric calculations have been performed using an engineering program known as Earthworks. The program utilizes an "open end area method" to compute volumes. Basically, the method cuts two slices of an area to be excavated, finds their average area, then multiplies this average area by the distance between the two sections. Traditionally, this method has been calculated by hand with accuracy limited only by the number of sections calculated; the more sections created, the greater the accuracy. Earthworks automatically calculates thousands of sections with minimal (6 inch) separation. Which in effect results in continuous sections, producing accuracy which is only limited by the topographic information provided.

Earthwork's printouts typically come in the form of a colored map. Various colors represent depths of cut or fill of a project. Each color is referenced by a scale bar to a corresponding depth. In this case, all volumes are a cut.

Results

Volumes of deposits under the Orykta® claims have been calculated at 938,522,358 cubic yards. These calculations were made assuming that deposits extend a depth of 800 feet below a point located on the claim, with ground elevation of 5800 feet above mean sea level. The 5800' base elevation and 800 foot depth of deposit has been furnished by the company, based upon their prior test boreings in the area.