

## Approximate Original Contour Guideline

### Definition:

ARM 17.24.301(13) "**Approximate original contour**" means that surface configuration achieved by backfilling and grading of disturbed areas so that the reclaimed area, including any terracing or access roads, **closely resembles the general surface configuration of the land prior to disturbance and blends into and compliments the drainage pattern of the surrounding terrain, with all highwalls, spoil piles and refuse piles eliminated. (Emphasis added)**

### Statement of Principle:

"Approximate Original Contour", or AOC, is the requirement that reclamation plans restore as nearly as possible the general pre-mine surface configuration of the disturbed area, and blend with the surrounding terrain. It does not require precise replication of the pre-mine land surface or elevations. The basic AOC evaluation is based upon an overall comparison of the applicant's proposed post-mine topography (PMT) and land use against the pre-mine topography and land use. With the possible exception of specialized alternate reclamation cases (see 1(A) below), prescribed land use goals are met by re-establishing the affected area's pre-mine ecologic function. The pre-mine ecologic function is dependent on the surface topography (slope, aspect), drainage system, groundwater regime, soils and vegetation types, wildlife and other ecologic and land use factors.

Reclamation to AOC is a key element in the restoration of the pre-mine ecologic functions in the post-mine landscape. Therefore, in order to meet AOC requirements, the proposed post-mining topography must not just resemble the general pre-mining topography, but must also provide for the protection of the hydrologic balance (ARM 17.24.314), the re-establishment of appropriate drainage systems (ARM 17.24.631), groundwater regime (ARM 17.24.314, 643-4), soils (ARM 17.24.701-03) and vegetation types (ARM 17.24.711), and consideration of wildlife (ARM 17.24.312, 751), grazing (ARM 17.24.762), and other ecologic and land use related needs.

The most obvious foundation for re-establishing the post-mining ecologic function and land-use would be to restore the area to its exact pre-mine configuration. As this is generally not feasible, the intent of this guideline is to further define what is required for a PMT plan to be considered AOC. This document should provide guidance for the development and evaluation of PMT plans to meet the AOC requirements in future permit application or revision packages.

### Criteria for AOC Development and Evaluation:

There are three cardinal requirements of AOC:

- I. **The post-mine land surface must closely resemble the general surface configuration of the land prior to disturbance.** Overall, flat terrain should be reclaimed as flat terrain, rolling terrain as rolling terrain, etc. If specific features are necessary to achieve resemblance to the general pre-mine configuration, they must be replaced. In addition, the primary characteristics of the pre-mine terrain (slope, aspect, drainage density, etc.) need to be retained to the extent possible so that the post-mine landscape can provide for reestablishment of the required ecologic and land use functions, mandated elsewhere in the Act and Rules

- A) Features deemed necessary for achieving "general resemblance" will be determined in consultation with the Department. In addition, some features may be essential to specific ecologic functional requirements in the rules. Features can be shifted, relocated or modified if there are no adverse effects on reclamation goals and standards. The required overall resemblance of the general pre-mine surface configuration must be maintained, and the landscape must blend with and compliment the surrounding terrain.

Alternate reclamation scenarios may, in special and unique cases, limit or eliminate the application of AOC criteria. Such cases *may* be approved *only* in relation to 82.4.232 MCA and ARM 17.24.821-23.

- B) The slope and aspect components of AOC will be evaluated quantitatively by the Department when reviewing permit applications or major revisions. This evaluation will include topographic data derived from appropriately spaced pre- and post-mine surface grids. The data will be summarized and compared on the basis of the affected area as a whole.
- C) The density of drainages and the drainage pattern in the reclaimed landscape must be similar to that of the pre-mine landscape, as determined on a drainage-basin-by-drainage-basin comparison. If significant changes in drainage density or pattern are proposed, the operator must clearly demonstrate that the proposed changes can meet the requirements of stability, protection of the hydrologic balance, and the restoration of the other post-mine ecologic and land-use functions.

**II. The reclaimed land surface must blend into and compliment the drainage pattern of the surrounding terrain.** Where applicable, a reclaimed drainage must be connected to the undisturbed up- and down-gradient drainage segments. Reclaimed drainages must blend into surrounding drainages and pass through the reclaimed area at an appropriate grade. All reclaimed drainages must restore similar amounts of runoff to the down-gradient native drainage.

**III. Reclamation must eliminate all highwalls, spoil piles and refuse piles.** All highwalls must be eliminated by "Reduction, backfilling, or grading ... to the approximate original contour of the land" (82-4-232(1), MCA). In certain cases, such as topographic replacement or wildlife habitat features, vertical or near-vertical rock faces are required in the post-mine landscape as part of standard reclamation practice. This can be accomplished by blasts or other techniques designed to alter the original highwall and produce irregular but stable faces. (See additional guidance under Comment 5, below.)

Lands affected by boxcut spoils and out-of-pit spoils are not exempt from the AOC requirements. Additionally, boxcut spoil disposal is to be specifically handled under ARM 17.24.501(4), and excess spoil resulting from thick overburden must meet the requirements of 17.24.520.

**Additional principles that operators should note:**

1. AOC is to a degree a subjective, case-by-case determination. While more than one PMT configuration may be capable of meeting the general requirements of AOC, the

most acceptable configuration will be the one which most closely resembles the pre-mining topography, and best provides for the post-mine ecologic and land use goals.

2. Applicants should be prepared to submit sufficient information (relative to the above criteria) on the pre-mine landscape and their proposed PMT in a format that will allow the quantitative comparisons, by the Department, described in I(B) and (C) above. Key parameters for this presentation should be worked out in consultation with the Department.
3. The PMT plan must take into account potential impacts to post-mine landowners' *legal* rights, especially where more than one surface owner may be involved. Considerations such as water rights, water distribution, grazing or cropping patterns, or any other factor that may affect the ability of a landowner to maintain a pre-mine land use after reclamation is complete, must be addressed as the PMT plan is developed.
4. Operators should employ the appropriate and opportune use of micro-topographic features such as small depressions, hillocks, rock piles, scoria or gumbo features, rock ledges and outcrops, etc., where it can be shown that these are comparable to the pre-mine landscape, and compatible with or necessary for the achievement of the post-mine land-use goals and standards. If these features are of too small a scale to be shown on the PMT map, they should be represented as symbols on the map, and/or included in the appropriate narrative sections of the plan. Documentation of the pre-mine landscape should be used to justify this opportune reconstruction option.
5. Important macro-topographic features include over-steepened slopes and vertical faces. Over-steepened slopes are slopes of 3(h):1(v) or greater. These slopes usually have a minimal veneer of soil material or no soil at all, often containing a large percentage of rock fragments, and are important for the re-establishment of a variety of shrub and tree species. Vertical or near-vertical faces - including sandstone outcrops, hoodoo rocks and cliffs, and their associated transition or rubble zones - also provide necessary habitats for a variety of plant and animal species.

*To the extent that these habitats/features were present in the natural pre-mine landscape*, replacement of vertical faces or creation of specific habitat features are considered to be essential elements of standard reclamation practice. Incorporation of these features is essential to fully achieve AOC, compliment nearby reclaimed or native ground, and to accomplish postmine ecologic and land use goals. The Department considers these over-steepened and vertical face features to meet AOC when:

- \* They replace features that existed pre-mine and were disturbed by mining;
- \* They are sculpted or re-shaped to blend with the existing native habitats, as well as the reclaimed habitats;
- \* Pre-mine features are replaced on a horizontal linear foot basis, comparable to the pre-mine length; and
- \* It is demonstrated that the features can meet the required minimum static safety factor of 1.3.

6. Whenever an applicant desires to employ alternate, rather than standard, reclamation practices, such activities must comply with the requirements of 82-4-232 MCA and ARM 17.24.821-23. If the proposed activities will also change the post-mine land use, or involve alternate revegetation, they must also comply with ARM 17.24.824 and 825, as appropriate. *As in the case of standard reclamation, employment of alternate reclamation practices may justify relocating or even eliminating individual topographic features, but does not necessarily absolve the applicant from addressing the overall requirements of AOC" (See Cardinal Requirement #1.)*