Soil Guideline

This guideline offers suggestions to help ensure that the soil photographs submitted by the Operator as part of an Opencut Mining Permit application are of sufficient quality and detail to adequately describe soil and overburden thicknesses in proposed permit areas. ARM 17.24.218(1)(c) specifies that clear labeled photos showing the top three feet of the soil profile with a visible scale must be taken and provided to the department for each test hole.
Note: MCA 82-4-432(14)(a)(vi) requires three soil test pits for the *Dryland Opencut Mining Permit Application* be submitted, while the *Standard Opencut Mining Permit Application* requires one test pit per 3 acres with a maximum of 20 representatively spaced test holes for proposed permit areas that exceed 60 acres.
The example soil test pit photos included below, display the type of photos that would be "acceptable" to the Department as well as the type of photos that would not be accepted by the Department.

What to Look for in Evaluating Soil Depth in a Test Hole 82-4-403(15), MCA

- Soil or growth material is the dark and/or root-bearing material above the gravel and/or mine material source.
- The Department typically looks for soil material (growth media) that would be adequate for promoting and sustaining vegetation growth. That material can include both the A and B soil horizons, and is not limited to only the darkest top soil horizon with rich organic material.
- Soil material usually occurs to the depth of existing roots currently visible in the soil profile, as the roots indicate soil that is supportive of plant growth.
- Significant change in soil composition may indicate a change from soil material to overburden (for example, a significant increase or change in the amount of clay, sand or gravel included in the matrix).

Purpose of Photos

- To show the top 3 feet of the soil profile, ensuring that all soil and overburden available and required for bonding is shown, with depths recorded.
- To support and validate the soil and overburden thickness data recorded in table C2.
- To verify the amount of soil and overburden available to be salvaged and bonded for site reclamation.

How to Take a Clear Photo

- **Scale:**
  - Use a measuring tape or survey rod along test pit sidewall (inches).
  - Ensure inch and foot increments in the top 3 feet are clearly visible and legible in the picture.

- **Lighting:**
  - Avoid contrasts – Ensure that no shadows obscure the test pit profile to be photographed.
  - Position test pit so that sunlight will illuminate test pit sidewall for clear photos (ensure test photo is taken perpendicular to test pit sidewall and not at an oblique angle).
  - If lighting conditions are poor, use of the camera flash often provides sharper/clearer images.
  - Always check your photo for clarity before proceeding to the next test pit.

- **Labeling advice:**
  - Use Photoshop or a similar program to label breaks/depths of soil and overburden, top of product, etc., or physically mark the test pit with visible markers prior to taking the photo.
    - The pictures must clearly show the soil and overburden depths.
  - Label the front of the soil photos and site map with the proper *Soil Test Hole I.D.* as provided in the table in Section C2 of the application (i.e. T1, T2, T3, etc.).

- **Check clarity of photos taken:**
  - After taking each photo, review it on the camera for clarity before moving to the next test hole. If the photo is unclear, take additional photos to be sure an acceptable photo is taken for submittal.
  - Do NOT submit unclear photos (i.e. illegible scale, contrasting shadows, less than entire three-foot profile, too dark to see, so bright photo is washed out, etc.)
    - If unclear photos are submitted, the application will be deemed incomplete or deficient.

- **Amendments:**
  - Test holes are required for the proposed amendment area only and must meet the requirements of ARM 17.24.218, unless otherwise required by the Department.
  - The operator must submit photos with the amendment application from the previously approved permit if available. The soil photos can be obtained from the *Search Opencut Permits* tab located here: https://deq.mt.gov/mining/assistance

EXAMPLE SOIL PHOTOS:

Unacceptable Photo

Shadow covers test pit sidewall and soil profile cannot be seen. Scale not displayiing 3 feet of soil profile.

Acceptable Photo

Clear, discernable soil profile. Tick marks on Tape Measure can be clearly identified and tape measure extends 3 feet.

Unacceptable Photo

Shadow covers test pit sidewall and soil profile cannot be seen. Scale not displayiing 3 feet of soil profile. Scale dimensions not visible.

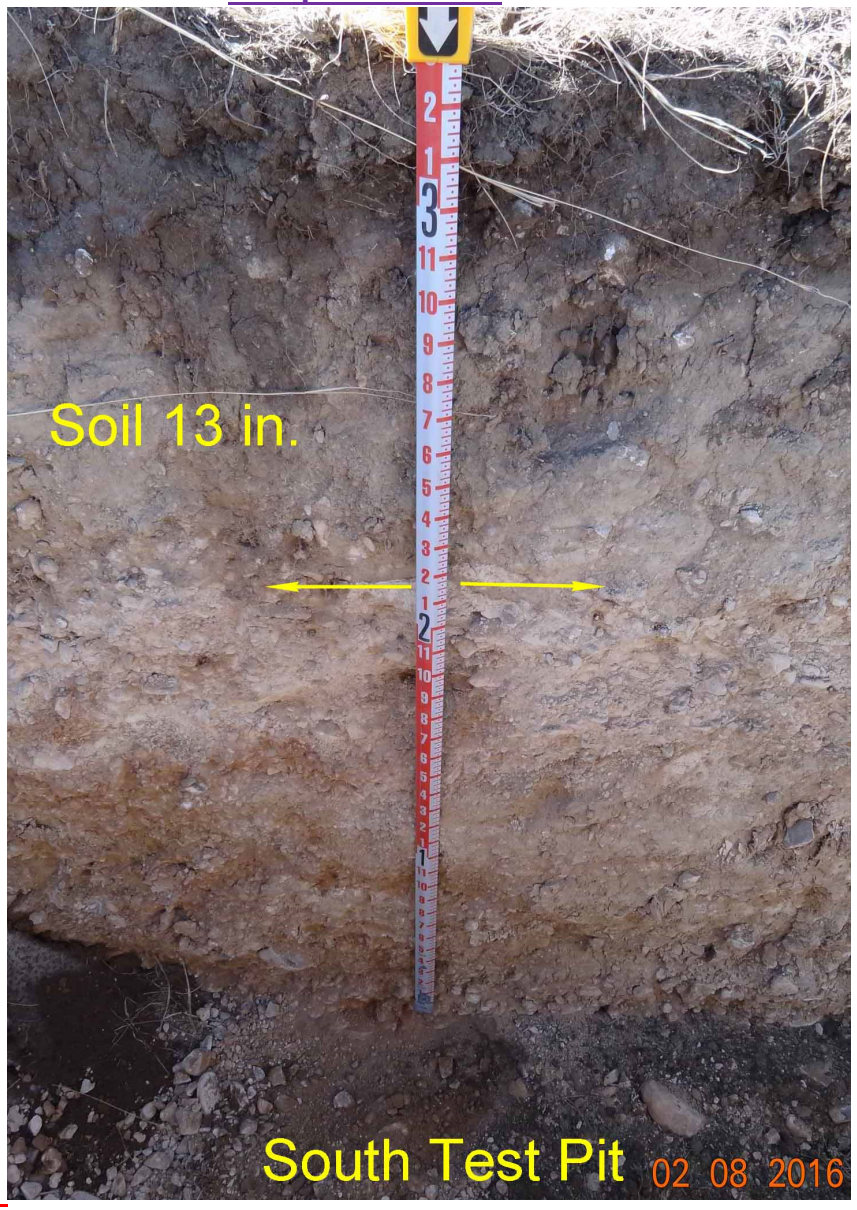
Acceptable Photo

Clear, discernable soil profile. Tick marks on Tape Measure can be clearly identified and tape measure extends 3'+.

Unacceptable Photo

Scale tilted, unreadable and useless in identifying soil depths.

Acceptable Photo

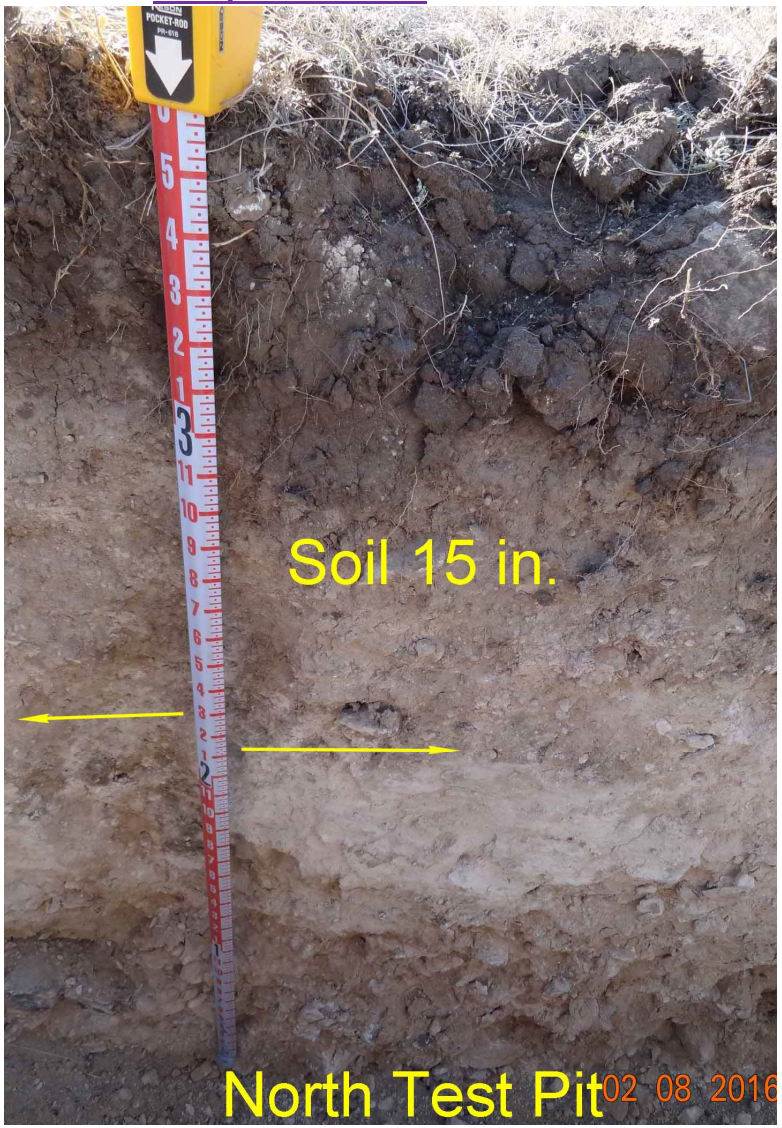


Scale clearly visible & shows top 3 feet of soil profile. Soil profile clearly visible and discernable.

Unacceptable Photo

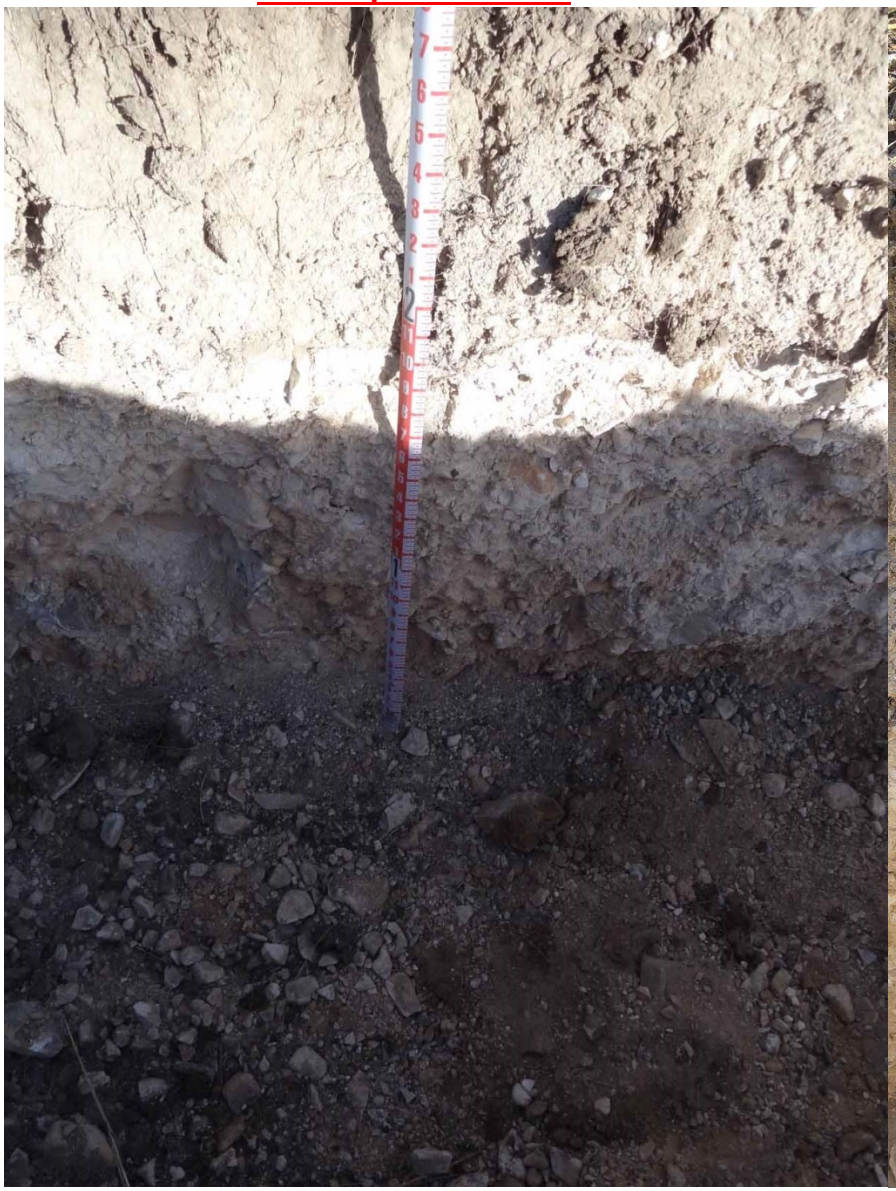
Angle looking down on soil profile is too steep to Identify soil characteristics or utilize scale accurately.

Acceptable Photo



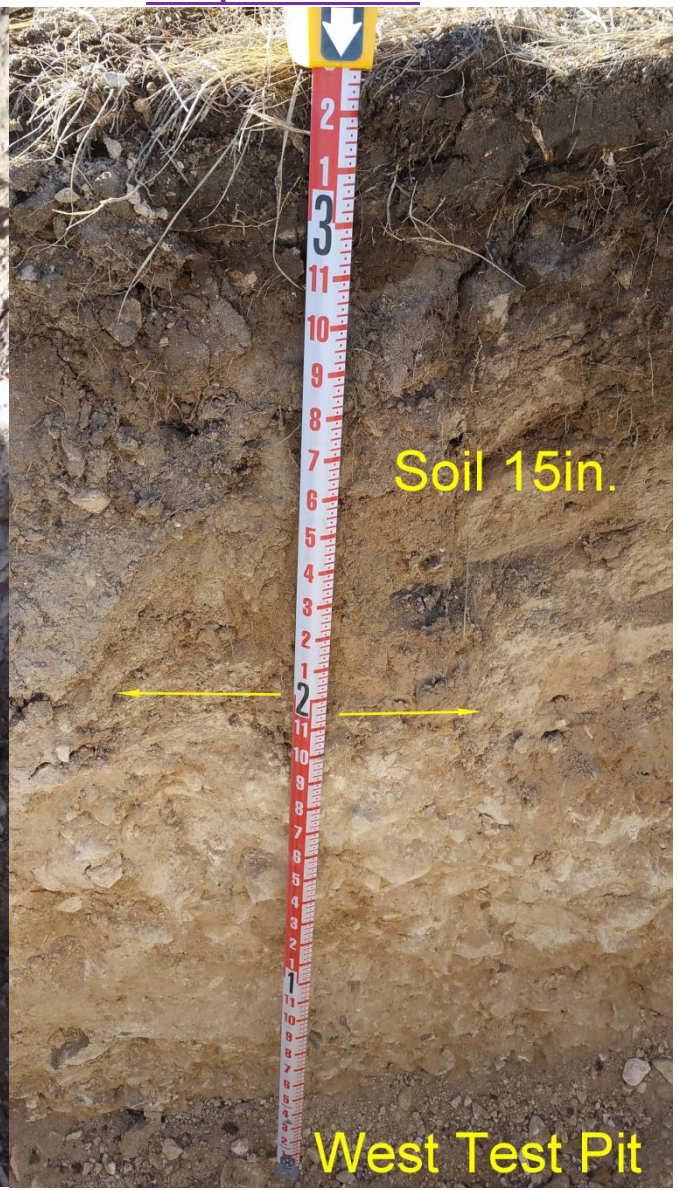
Scale and soil profile is clear and readable. Top three feet of soil profile is shown.

Unacceptable Photo



Top 3 feet of soil test pit is not shown and soil profile is washed out due to poor lighting, making the soil profile indiscernible.

Acceptable Photo



Top 3-feet of soil profile clearly shown and scale is clearly visible.

Unacceptable Photo

No scale in photo & shadow obscuring portion of test pit sidewall.

SOIL TESTHOLE REQUIREMENTS:

82-4-403, MCA provides the following definitions:

- Soil means the dark or root-bearing surface matter that has been generated through time by the interaction of biological activity, climate, topography, and parent material and that is capable of sustaining plant growth and is recognized and identified as such by standard authorities and methods.
- Overburden means the earth that lies above a natural deposit of materials.

ARM 17.24.218(1)(c) indicates that the Plan of Operation must include a soil and overburden characterization section that describes the average soil and overburden thicknesses in proposed permit areas determined on the basis of representatively-space test holes, as follows:

- No less than 3 test holes for less than 9 acres.
- One test hole for every 3 acres beyond 9 acres, with a maximum of 20 test holes for 60 acres or more.
- An alternative numbers of test holes may be approved by the department in the permit.

ARM 17.24.218(1)(c)(i) specifies that:

A. Test holes must be of sufficient depth to measure the thicknesses of soil and overburden.
B. Representative test holes must be located in both bonded and non-bonded areas.
C. Exposures of the soil and overburden profile, such as a roadcut, may be used in lieu of a test hole.
D. Clear labeled photos showing the top three feet of the soil profile with a visible scale must be taken and provided to the department for each test hole identified in C2 of the application.