

KENNECOTT EAGLE MINERALS COMPANY'S FACILITY LOCATION ALTERNATIVES ANALYSIS

The location of the surface facilities for the proposed Eagle Mine is based on two overriding considerations. First and foremost, the location of the mine portal must enable Kennecott to safely access the underground resource. Second, the portal and surface facilities must be located to minimize potential environmental impacts associated with mine operations. In addition to these primary objectives, Kennecott considered several other factors in evaluating alternative locations for the portal and surface facilities, including minimization of aesthetic impacts and impact of locations on future reclamation activities.

With these considerations in mind, Kennecott carefully reviewed and rejected the alternative of locating the portal and surface facilities on Kennecott property directly above or in close proximity to the ore body itself, since this would require the filling and/or substantial alteration of wetlands above the ore body and adjacent to the Salmon Trout River Main Branch. Kennecott also, after careful consideration, rejected the alternative of locating surface facilities on land some distance from the portal and mining area since this would markedly increase the environmental footprint of the overall operation, require duplicate engineered systems for managing water treatment and ore storage, and increase transportation requirements on public roads. Kennecott's alternatives analysis therefore focused on locating surface facility features close to various mine portal options. This analysis is illustrated in tabular form in the attached matrix, and the six locations considered are depicted in Figure 1. The following provides a narrative description of the mine portal options and paired alternatives for surface facility locations. The criteria used to evaluate the portal and related facility options are also described.

Portal options.

1. **Outcrop west face, underground entry:** For this option, the entry into the steep west portal rock face is below current grade. A steel arch originates approximately 37 meters west of the outcrop rock and begins a 15% decline such that the portal rock face entry is below current grade. The surface disturbance from portal construction is minimal for this configuration. Reclamation of this option would leave no visible evidence on the outcrop above the natural restored grade. This portal option is associated with Facility Location Alternatives 1 and 4.
2. **Outcrop west face, aboveground entry:** The entry into the steep west portal rock face would be at the current grade. A relatively short (5 to 10 meter) steel arch would enter the portal rock face near grade with the decline beginning under the outcrop. The surface disturbance from the portal construction would be minimal. However, disturbance to the outcrop itself (above grade) would be significant. Reclamation would mitigate the disturbance to the outcrop, but evidence of restoration would be visible at the portal rock face entry. This portal option is associated with Facility Location Alternative 2.
3. **Outcrop east face, underground entry:** The portal entry below ground into the gently sloped east outcrop face would require a steel arch longer than the arch proposed in the

outcrop west face associated with Facility Location Alternatives 1 and 4. The shallow entry angle with the outcrop rock would require more support than the steeper entry angle available on the west face. Additionally, more near surface blasting (thus more disturbance) would be required to install the portal. Reclamation of this option would leave no visible evidence on the outcrop above the natural restored grade. This portal option is associated with Alternatives 3 and 5.

4. **Vertical Shaft:** A vertical shaft would have to be located in close proximity to the ore body. The shaft would be equipped with hoists and elevators to enable material and personnel transport. To address water entry into the shaft from saturated alluvium, isolation methods would have to be employed to keep the shaft dry. Surface disturbance from this option is minimal, but the shaft would intersect an aquifer and move traffic and other activities associated with surface operations (such as staging and transfer of ore) much closer to wetlands and the Salmon Trout River Main Branch. Reclamation of this option would leave no visible evidence of disturbance. This portal option is associated with Facility Location Alternative 6.

Surface facility options.

Location of surface facility options paired with portal options are set forth as Alternatives 1 through 6 on Figure 1. As noted above, these alternative pairings were developed based on the basic design goal of keeping the portal and surface facilities within reasonably close proximity to each other and thereby minimizing the footprint of mine operations. The alternative combinations of surface facility and portal locations were evaluated based on several different criteria, the most important of which were:

Portal Safety. As noted above, this is the primary overarching criterion driving selection of portal location. As delineated in the attached table, all portal locations would enable Kennecott to access the ore body safely, but the design and construction methods differ significantly for certain options. These differences, in turn, have a substantial impact on other criteria considered.

Groundwater Protection: Available Unsaturated Zone for Groundwater Discharge. The Eagle Project proposes a groundwater discharge of treated water generated from planned mining activities. Treated water will be discharged within the main facility in a Treated Water Infiltration System (TWIS). The maximum design discharge rate is 504,000 gallons per day (MDEQ Groundwater Discharge Permit No. GW1810162). This discharge requires an adequate thickness of unsaturated soils so that discharge into that layer in all expected conditions would never produce mounding that intersects the ground surface. Although each Alternative provides adequate TWIS discharge media, locations with thicker unsaturated soils will further reduce mounding risk.

Surface Water Protection – Distance of Discharge to Closest Surface Water Downgradient of Facility. The Eagle Project has been designed to operate in a manner protective of the environment by incorporation of many engineering design and controls and operational practices in routine and atypical scenarios. Nevertheless, in an atypical situation, the distance from the facility to the closest surface water (in this case, the Salmon Trout River Main Branch) influences the risk to that surface water. Each alternative will provide a high degree of environmental protection. However, a longer distance between the facility and the nearest downgradient surface water substantially decreases any environmental risk associated with an atypical scenario.

Watershed Location. The immediate area of the Eagle ore body is in close proximity to a sub watershed divide between the Salmon Trout River Watershed and the Yellow Dog River Watershed. Locating the surface facilities and portal within one watershed, is, in Kennecott's view, preferable to splitting the facility between two watersheds.

Aesthetics. Aesthetic considerations include the visibility of the project and noise exposure to surrounding publicly accessible locations. The ability to manage negative aesthetics is evaluated for each alternative. Triple A Road is the public road adjacent to the project (Figure 1), therefore proximity to it influences the ability to manage aesthetics. The presence of the outcrop between the facility operations and Triple A Road also influences the resulting visual and noise aesthetics.

Prior Disturbance of location. The area surrounding the Eagle ore body has been clear cut fairly recently. The quantity of tree removal and level of modification to current habitat has been addressed in this criterion. Figure 1 is a high-resolution photograph background upon which a high-level visual evaluation can be made of each alternative location. Further details of the flora and fauna in this area are described in the EIA.

Ownership of Surface and Mineral Rights. The ability to legally use and access the surface and subsurface locations considered is addressed in this criterion. Although Kennecott does not own the surface of five of the six alternatives locations considered, it owns or leases the mineral rights under each location. Under the terms of its mineral leases with the state under these areas, Kennecott has the right to construct and operate surface facilities so long as the facilities and the leased minerals being extracted comprise "a common mining operation" area. Although Kennecott and the DNR do not agree as to whether the Eagle project operation comprises a common mining operation area as defined in the pertinent leases, Kennecott does not believe, based on discussions with MDNR, that this disagreement will prevent Kennecott from building and operating surface facilities at the location alternatives considered. Nonetheless, it was one of the criterion Kennecott used in its evaluation.