Assignment-2: group:25

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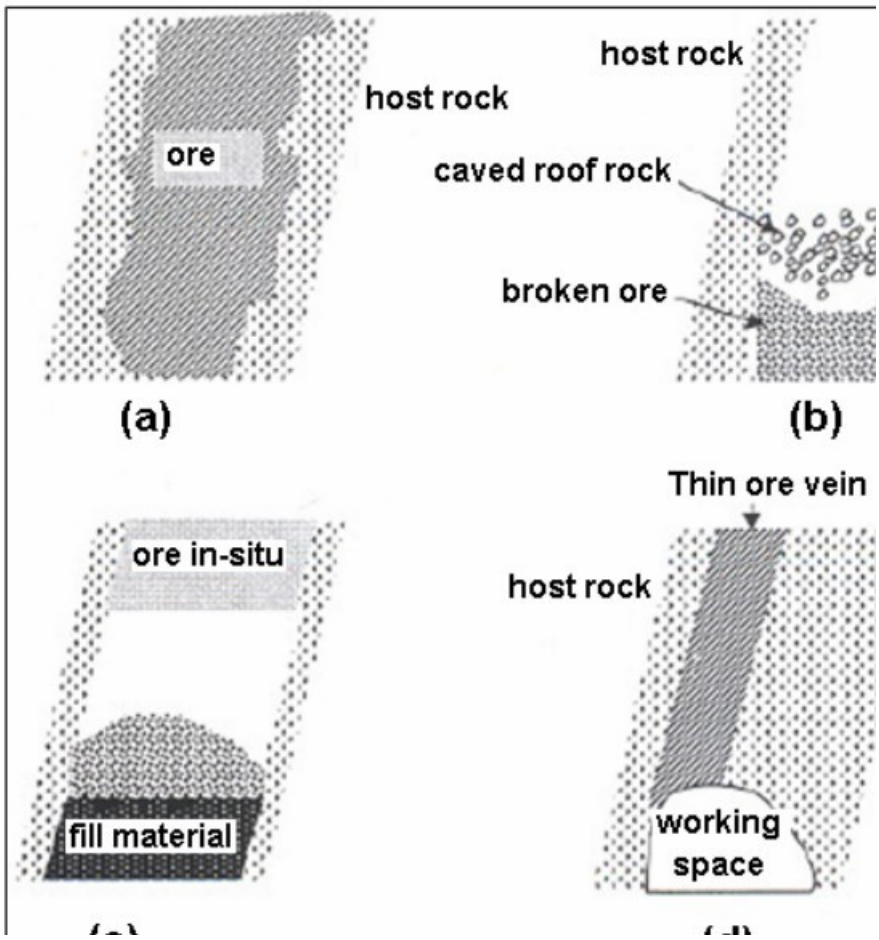
Dilution is the contamination of the ore by non-ore material . It lowers the quality of the mine product and increases the production cost as a result of handling and the processing of the contaminant. The consequences of this contamination are as follows:

- The actual amount of material extracted will be larger than what is necessary to obtain the same equivalent metal content.
- The grade of the run-of-mine ore will be lower than the estimated in-situ grade.

The consequences stated above directly increase the cost of production (i.e. cost per unit weight of metal mined) since the waste material must be: mucked; transported; crushed; processed and stored as tailings. Furthermore, a mill is designed to operate at a given mill feed grade; lower grade material can unbalance the system resulting in decreased mill recoveries. The mining of waste material also results in an opportunity cost since ore is displaced by waste within the overall mine/mill circuit. This displacement effectively increases the mine life which spreads the cash flow over a longer period of time, resulting in an overall decrease in net present value.

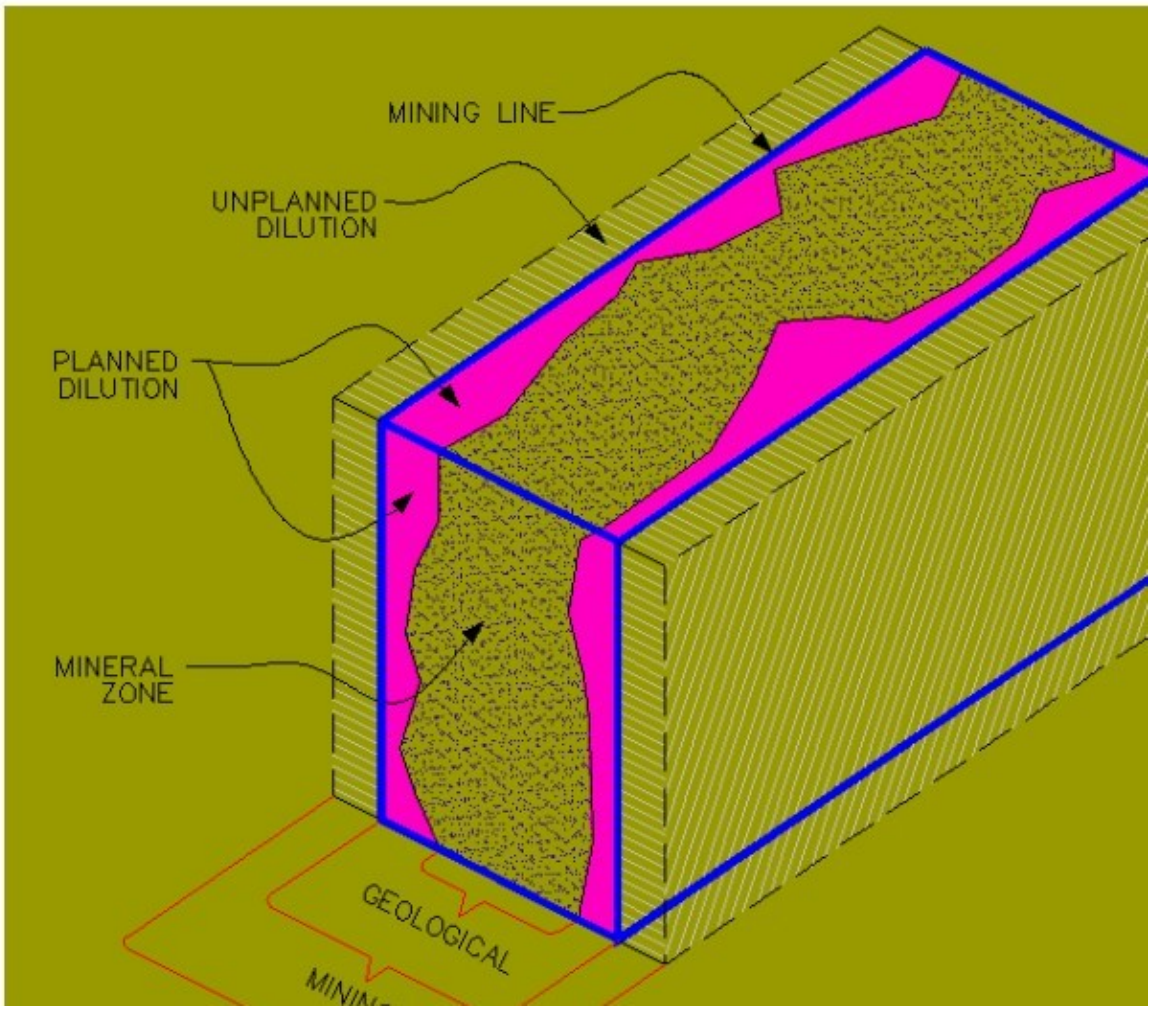
Dilution can occur in two ways: Production dilution and structural dilution (below figure) Contamination of the ore by waste rock may be caused by irregular shape of ore-waste contacts, by the overlying caved waste rock in caving operations, by the mixing of the fill material in the filling operations during the mine production process. Structural type of dilution, such as several waste rock bands within the ore body, occurs inherently related to the geological structure of the ore where selective mining is not suitable.



There are two types of dilution that are identified, planned dilution and unplanned dilution (Below figure) These come from the following sources:

- Planned Dilution
  - "Internal" dilution from barren dykes and waste inclusions (note that dykes are often narrow and somewhat erratic and, as a result, cannot be effectively separated as waste during mining. Therefore, they are included in the resource estimate as part of the ore zone).
  - "Design" dilution where waste material is mined in order to improve the geometry of a stope.

- "Hangingwall" dilution in both longitudinal stopes and some Deep Ore Transverse stopes.
- "Footwall" dilution (which is often low-grade material).



- Unplanned Dilution
  - "Backfill" dilution from sidewalls (adjacent stopes) during extraction of secondary and tertiary stopes and from back of blind primary and secondary stopes.
  - "Overbreak and/or sloughing" dilution from unstable wall rock induced by blasting of stope.

There are various methods for dilution calculation. Some important definition of dilutions is summarized as follows

EQ1 Dilution = (Waste mined) / (Ore mined) * 100

EQ2 Dilution = (Waste mined) / (Ore mined + Waste mined)* 100

EQ3 Dilution = (Undiluted in-situ grade reserves) / (Mill head grades obtained from same tonnage) *100

EQ2 Dilution definition is used in CBI for dilution calculations. This can also be expressed as: Waste D = * 100 Ore + Waste