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California Code of Regulations (CCR) §3704.1. Metallic Mine Backfill Regulations Explained

CCR §3704.1 was adopted by the State Mining and Geology Board in 2003. It specifies conditions under which the backfilling of open pit excavations for metallic surface mines must be undertaken pursuant to the Surface Mining and Reclamation Act of 1975 (SMARA, Public Resources Code § 2710 et seq.). The regulation requires land affected by the surface mining operation must be reclaimed to a condition that approximates the natural conditions of the surrounding land and topography. Below is a brief overview of each sub-section of CCR §3704.1

§3704.1 *Performance Standards for Backfilling Excavations and Recontouring Lands Disturbed by Open Pit Surface Mining Operations for Metallic Minerals.*

Notwithstanding the provisions of Section 3700(b) of this Article, no reclamation plan, including any reclamation plan in which the end use is for wildlife habitat, wildland conservation, or open space, or financial assurance for a surface mining operation subject to the provisions of this section, shall be approved by a lead agency unless the reclamation plan meets the provisions of this section. Financial assurances must be maintained in an amount sufficient to provide for the backfilling and contour grading of the mined lands as required in this section.

The preamble to this regulation stipulates that the conditions for backfilling of an open pit metallic mine are not subject to the conditions of CCR § 3700(b), which provides that a lead agency may, at its discretion, exempt a mine from some reclamation requirements. Open pit metallic mines leave huge piles of waste rock and leached ore on the surface, in addition to leaving a large, empty pit, following the mining excavation operations. It is the purpose of this regulation to ensure that these large piles of waste rock are returned to the open pit, with any residual waste rock contoured about the surrounding surface to approximate the original topography. Lead agencies do not have local discretion to exempt these types of mines from the reclamation requirements to backfill. Granting such an exemption would defeat the purpose of this regulation.

§3704.1(a) *An open pit excavation created by surface mining activities for the production of metallic minerals shall be backfilled to achieve not less than the original surface elevation, unless the circumstances under subsection (h) are determined by the lead agency to exist.*

This subsection states the requirement that open pit metallic mines must be backfilled to surface grade. This subsection ensures that large open pit excavations, that may attain several hundred feet in depth and hundreds of acres in areal extent, are to be re-filled with the material that was excavated from the pit. The purpose is to eliminate large open excavations

and leave very large waste rock piles on the landscape following the conclusion of mining operations so that the land can be re-used for a beneficial purpose.

§3704.1(b) *Backfilling shall be engineered, and backfilled materials shall be treated, if necessary, to meet all of the provisions of Title 27, California Code of Regulations, Division 2, Chapter 7, Subchapter 1, Mining Waste Management, commencing with Section 22470, and the applicable Regional Water Quality Control Board's Water Quality Control Plan.*

It is necessary that materials utilized in the backfilling process will not be harmful to local surface and groundwater resources. In addition, the process of backfilling must be treated and engineered so as to protect water quality. These requirements are contained in the State Water Control Board's regulations, which are referenced for clarity.

§3704.1(c) *Excavated materials remaining in overburden piles, waste rock piles, and processed or leached ore piles not used in the backfilling process and remaining on the mine site shall be graded and contoured to create a final surface that is consistent with the original topography of the area. Care shall be taken to avoid the creation of un-natural topographic features, impediments to natural drainage, or conditions hazardous to human life and wildlife.*

When consolidated rock material is excavated from a pit, the volume of the rock material may expand on the order of 30 percent to 40 percent (swell factor), depending on the material's composition and the degree of disaggregation. Therefore, it is most likely that there will be a surplus of material remaining on the surface around the pit, even after a substantial portion of the waste rock has been placed into the pit. This "extra" volume of material must be contour graded in a manner respectful of the surrounding and original landscape to minimize potential impairments to the immediate environment. The regulation states that care must be taken to avoid the creation of un-natural drainage features or conditions dangerous to human life and wildlife.

§3704.1(d) *Backfilling, recontouring, and revegetation activities shall be performed in clearly defined phases to the engineering and geologic standards required for the end use of the site as stipulated in the approved reclamation plan. All fills and fill slopes shall be designed to protect groundwater quality, to prevent surface water ponding, to facilitate revegetation, to convey runoff in a non-erosive manner, and to account for long term settlement.*

This subsection further clarifies that the reclamation activities associated with backfilling, recontouring, and revegetation must be accomplished to meet specific standards for the approved end use of the site following reclamation. This is necessary to ensure that reclamation work is not done to a lesser standard than necessary, and which may preclude the reclaimed lands from being used in the originally planned and approved manner.

§3704.1(e) *The requirements of subsections (a), (b), (c), and (d) notwithstanding, no final reclaimed fill slopes shall exceed 2:1 (horizontal:vertical), nor shall the resultant topography exceed in height the pre-mining surface contour elevations by more than 25 feet. Final fill slopes shall have static and dynamic factors of safety, as determined by an engineer licensed in California, that are suitable for the proposed end use of the site and meet or exceed the requirements of applicable building or grading codes, ordinances, statutes, and regulations. Final slopes must be capable of being revegetated, and shall blend visually with the local topography. Surface soil shall be salvaged, stored, and reapplied to facilitate revegetation of recontoured material in accordance with the requirements of Section 3711 of this Article.*

The reclamation of fill slopes must be accomplished to ensure their stability over time. The requirement for a minimum 2:1 (H:V) slope grade is to ensure that the fill slopes can be revegetated; slopes with steeper gradients are less likely to be successfully revegetated. This is in concurrence with §3704 of this same Article 9. In addition, California is a seismically active state, and fill slopes must be designed to meet minimum, specific dynamic loads and attain specific factors of seismic safety. The requirement to store surface soil prior to recontouring piles of waste rock is to ensure that there is a local soil supply for use in the revegetation process.

§3704.1(f) *For the purposes of this section, a metallic mine is defined as one where more than ten percent of the mining operation's gross annual revenues as averaged over the last five years are derived from the production of, or any combination of, the following metallic minerals by the open pit extraction method: Precious metals (gold, silver, platinum); Iron; Nickel; Copper; Lead; Tin; Ferro-alloy metals (tungsten, chromium, manganese); Mercury; Uranium and thorium; Minor metals including rubidium, strontium, and cesium; Niobium and tantalum;*

It is necessary to define a “metallic mine” to which this regulation applies, in that there are many open pit mines that produce minerals other than metallics, such as industrial minerals, rare earth minerals, sand, gravel, dimension stone, etc. In addition, some mines produce, as a secondary product, metallic minerals in sub-commercial quantities if produced alone, but certainly add to a mine’s overall revenue stream. Mines that produce metallic minerals in sub-commercial amounts as a secondary product are not affected by these regulations; however, it is necessary to define when the production of the secondary mineral product crosses a threshold and becomes a primary revenue product. Therefore, the metallic mine is defined by its primary metallic product, as well as by the average percent of revenue derived from the metallic mineral production.

§3704.1(g) *For the purposes of this regulation, an open pit mine is the same as an open pit quarry, opencast mine, or opencut mine, and is defined as a mine working or excavation that is open to the surface and in which the opening is approximately the full size of the excavation.*

An open pit mine may be called by several names; these names have been included for completeness to indicate that, regardless of the preferred name of the feature, the regulation applies. The definition of an open pit mine as a “mine working” or “excavation” is derived from the Dictionary of Mining, Mineral, and Related Terms, Second Edition, 1997, compiled by the American Geological Institute.

§3704.1(h) *The requirement to backfill an open pit excavation to the surface pursuant to this section using materials mined on site shall not apply if there remains on the mined lands at the conclusion of mining activities, in the form of overburden piles, waste rock piles, and processed or leached ore piles, an insufficient volume of materials to completely backfill the open pit excavation to the surface, and where, in addition, none of the mined materials has been removed from the mined lands in violation of the approved reclamation plan. In such case, the open pit excavation shall be backfilled in accordance with subsections (b) and (d) to an elevation that utilizes all of the available material remaining as overburden, waste rock, and processed or leached ore.*

Not all open pit metallic surface mines have enough waste rock remaining at the conclusion of mining activities to completely refill the pit from which the minerals were mined. In some instances, even allowing for the “swell factor”, there is only enough waste rock to partially backfill the pit. In these cases, mines must be backfilled only to a level that uses all of the remaining quantity of waste rock. Requiring a mine to backfill to the surface level, in these

cases, would necessitate digging another hole to import fill material to the mine site; this would defeat the purpose of the regulation by requiring the digging of one hole just to fill another.

§3704.1(i) *This regulation does not apply to any surface mining operation as defined in Public Resources Code Section 2735(a) and (b) for which the lead agency has issued final approval of a reclamation plan and a financial assurance prior to December 18, 2002.*

Reclamation of a mine site has a cost which must be factored into a mine's operations and market product pricing. Mines currently in operation with approved reclamation plans already are repaying the costs of reclamation in their product pricing; therefore, imposing an additional reclamation cost on existing operations may conceivably force existing mine operation into debt. Therefore, those mines with reclamation plans and financial assurances approved by their lead agencies prior to December 18, 2002, at which time the emergency regulation imposing similar backfill requirements on metallic mines became effective, are exempt from the requirements of this regulation.