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Table 2 Earthwork Equipment Production Factors

Parameter	Value	Comment/Reference
Swell Factor ⁽¹⁾	0% for native rock and compacted fill 8% for cover load & haul sites	Regraded material and compacted fill has no swell factor. Cover material volumes are calculated based on the reclaimed area and the cover depth. A swell factor is included in the cost estimate while calculating the bank cover volume.
Coarse Regrading Tops and Outslopes (D11T CD)		
Operator Factor ⁽¹⁾	1.0	Due to large job size assume operator with excellent skills (CPH 48: 19-55, excellent)
Material Factor	1.2 1.0	(CPH 48: 19-55) 1.2 for fine grading cover, other surfaces, and channel, 1.0 for coarse regrading stockpiles and tailing
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Grade Factor – Tops	1.0	(CPH 48: 19-55) 1 to 5% Slope
Grade Factor - Outslopes ⁽¹⁾	1.6	(CPH 48: 19-55) 3H:1V Slopes
Material Weight (lb/cy)	3,600	Stockpiles & Cover Materials
Production Method/Blade Factor	1.2	(CPH 48: 19-55) Slot dozing
Visibility Factor	1.0	(CPH 48: 19-55) Clear, dust controlled by water trucks
Elevation Factor	1.0	(CPH 48: 30-7) Horsepower reduction table
Direct Drive Transmission	1.0	-
Fine Grading Cover, Other Surfaces, and Channels (D11T CD, D9T, D6T, 16M, 14M)		
Material Factor	1.2	(CPH 48: 19-55) fine grading cover
Grade Factor – Tops	1.0	(CPH 48: 19-55) 1-5% slopes
Grade Factor – Outslopes ⁽¹⁾	1.6	(CPH 48: 19-55) 3H:1V Slopes
Material Weight (lb/cy)	3,600	Fine grading cover material
Production Method/Blade	1.2 1.0	(CPH 48: 19-55, slot dozing) No correction applied channels, downdrains, and benches
Effective Blade Width (feet [ft])	22.0 ft D11T CD 14.08 ft D9T Semi Universal Blade 16 ft 16M, 14 ft 14M 10.67' D6T SU	(CPH 48: 19-17, 19-49) (CPH 48: 19-47) (CPH 48: 11-17) (CPH 48: 19-10, 19-43)
Speed (miles/hr)	2.5 mph D11T CD, 16M, and 14M 1.0 mph D9T and D6T	(CPH 48: 11-19, 19-24, 19-25) maximum equipment speeds based on information provided in the Cat Handbook and Safe mining practices
Operator Factor ⁽¹⁾	0.75	(CPH 48: 19-55) Average operator skill
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Visibility Factor	1.0	(CPH 48: 19-55) Clear, dust controlled by water trucks
Elevation	1.0	(CPH 48: 30-7)

Parameter	Value	Comment/Reference
Excavator (319D L)		
Work Hour (min/hr)	50	(CPH 48: 19-55) Job efficiency
Heaped Capacity (cy)	1	EquipmentWatch spec
Sheepsfoot Roller Length (ft)	3	Estimated
Maximum Reach at Ground Level (in)	380	EquipmentWatch spec
Swing Time (Loaded) (min)	0.09	(CPH 48: 7-247)
Swing Time (Empty) (min)	0.07	(CPH 48: 7-247)
Deere 7430 (and Finn B260 Mulcher, MSR-189H Ripper)		
Operating Width (ft)	12	Assigned based on typical width of revegetation equipment/implements
Speed (mph)	3	Assigned as average speed of tractor pulling revegetation equipment/implements
Work Hour (min/hr)	50	Assigned for consistency with other earthwork operations

CPH = Caterpillar Performance Handbook (Multiple Editions)

⁽¹⁾ The swell and operator factors used are consistent with factors presented to MMD and NMED in meetings with Tyrone on June 11, 2012, November 2, 2012, and a letter to MMD and NMED from Tyrone dated September 5, 2012 ([Freeport-McMoRan Copper & Gold, 2012](#))(~~Freeport-McMoRan Copper & Gold, 2012~~). Furthermore, these were agreed to in discussions on Chino expansion projects.

⁽²⁾ Performance information for the CAT 5230B FS is used for parameters unavailable for the Hitachi EX3600-5.

⁽³⁾ Performance information for the CAT 789D is used for parameters unavailable for the Komatsu 730E.

number of FA amendments, Tyrone has included costs for plugging and abandoning ten exploration drill holes outside the open pit boundary.

Nine monitoring wells will be abandoned after 30 years of post-reclamation sampling and five wells located within regraded stockpile footprints will be replaced during closure.

Exploration hole plugging and well abandonment unit costs estimates will be based on MMD guidance for abandoning wet drill holes.

3.3.2 Demolition

Utilities serving structures to be demolished and remaining concrete slabs are included in the estimate for demolition and include:

- 46 kilovolt powerline
- Substation
- Pipelines
- Concrete slabs

Power transmission lines and substation will be removed once they are not needed for post-closure purposes. ~~Power poles will be left in place to serve as raptor perches after reclamation.~~ Powerline corridors will be revegetated as needed.

Pipeline demolition includes removal of residual sediments from pipelines and disposal of materials at an approved location, removal or burial of pipelines, covering impacted areas with 36 inches of cover material, and revegetation of disturbed areas.

[Unit costs for powerlines and power poles are developed based on recent cost information \(R.S. Means, 2021\). The total footage of each is multiplied by the respective unit cost. Light poles and telephone wires/pole unit costs are assumed to be equivalent to unit costs to demolish powerlines and power poles.](#)

Concrete slab demolition includes breaking up and burying the concrete in-place, covering areas with 36 inches of cover material, and revegetation of disturbed areas.

3.3.3 Other Roads and Pipeline Corridors

The existing Deadman Spanning Arch Culvert will exist EOY 2024. Reclamation costs assume the spanning arch culvert will be demolished during the construction of the Deadman Canyon Diversion at closure. Reclamation quantities were estimated from the existing spanning arch culvert as-builts, completed September 15, 2011. Earth fill associated with the Spanning Arch Culvert will be excavated and used to construct the Deadman Diversion. Concrete and metal debris will be hauled to the operational in-pit stockpile and buried.

Other access roads not listed under Section 3.2, will be reclaimed by ripping, constructing berms where required for safety reasons, and revegetating. Costs will also be included for O&M activities. See Table 3.

As of June 2020, there are 2 seepage collection systems located at CLS Leach and they will be left in place.

After 30 years of O&M, pipeline corridors will be ripped and revegetated.

3.3.4 Little Rock Open Pit

Accessible open pit flat areas, above the anticipated EOY 2024 open pit lake elevation of 5,669 ft. will be ripped to a depth of 18 to 24 inches and revegetated. For the purposes of this cost estimate, accessible open pit flat areas are defined as flat areas located 50-feet or greater from a highwall.

A combination of 6-foot chain link fence and earthen berms will be located along the Little Rock open pit boundary, approximately 40 feet from the open pit highwalls to limit public access. Signs will be posted on fencing at 500-foot intervals. Revegetation is included for an approximate 25-foot wide disturbance area to construct chain link fencing and 100-ft wide disturbance area for berm construction.

See Table 3, for a list of activities that will occur in closing the Little Rock Open Pit.

3.3.5 West Canyon Stockpile, North Stockpile, and Precipitation Plant (P-Plant)

The West Canyon Stockpile and North Stockpile are naturally revegetated and additional reclamation activities will not disturb the established vegetation (EOY 2024). Reclamation costs for West Canyon Stockpile and North Stockpile will be included for 2 years of vegetation maintenance.

The P-Plant was reclaimed in 2010 and revegetated in August, 2010. On June 20, 2011 partial financial assurance was released. In a letter from Tyrone dated January 15, 2013, release of the remaining financial assurance was requested with the exception of the vegetation and erosion control monitoring. MMD assigned modification number 13-1 to Permit No. GR007RE for this request. For FA purposes, it is assumed that the P-Plant will be disturbed in the 5-year mine plan. See Table 3, for a list of activities that will occur in closing the P-Plant.

3.3.6 Allowance for Other Disturbed Areas

Tyrone will include costs in the CCP earthwork cost estimate to account for the dynamic nature of mining. This approach is intended to allow for greater flexibility in meeting the mine planning schedule and reduce the number of FA amendments. Unplanned disturbed areas may include but limited to small staging areas, utility corridors, haul roads, pull-offs, ~~stockpile expansions~~, or other miscellaneous unforeseen changes in the mine plan. See

Table 3, for a list of activities that will occur in closing the unplanned disturbed areas for an additional 10 acres.

3.4 Deadman Canyon

At closure, Tyrone will use scrapers to remove the material from Northern Haul Road and place it in the Deadman Diversion to re-establish Deadman Canyon. The fill material beneath the diversion (approximately 1/3 of total fill volume) will be placed in lifts and compacted to 90% proctor using a water truck. The remaining fill will be end dumped. For FA purposes, it is assumed that the fill to build Deadman Diversion, will come from the Northern Haul Road, Spanning Arch Culvert (Southern Haul Road material), and the East In-Pit Waste.

The diversion will be constructed as follows (see Table 3):

- 6” compacted fine grade subgrade (90% proctor) mixed with clay material
- Non-woven geotextile filter fabric
- 6” crushed gravel base course
- Geogrid
- ACBs

3.5 Little Rock Permit Boundary Overlap Area

Reclamation coverage in the RCE will be evaluated relative to the reclamation covered in the proposed Little Rock Design Limit and MMD Permit Boundary. If reclamation activities are included in the overlap area of the two permit boundaries, the activities will be included in the Little Rock RCE.

3.6 Operations and Maintenance

O&M costs related to periodic erosion control, road maintenance, and vegetation maintenance will be included in a standalone calculation sheet that will be submitted when the Scope of Work is approved.

Little Rock Mine reclamation costs assume O&M begin Year 1 and include 12 years of vegetation maintenance [per facility \(20 years total\)](#), 12 years of erosion control [per facility \(20 years total\)](#), 30 years of water quality monitoring and reporting, and 30 years of road maintenance.

Erosion Control and Monitoring: Little Rock Mine annual erosion control and monitoring cost estimates are based on an erosion control crew engaged for 10 days per year for the first year and then 4 days per year for an additional ~~11~~[19](#) years for a total of ~~12~~[20](#) years of monitoring.

Water Quality Monitoring and Reporting: Sampling will be conducted quarterly the first 2 years after reclamation, semi-annual for the next 8 years, and yearly for the remaining 20 years, for a total of 44 sampling events over 30 post-closure years.

- Nine post-closure monitoring wells remain by EOY 2024 (monitoring wells are plugged after 30 years of post-reclamation sampling as described in Section 3.3).
- It is assumed that open pit water will be present and sampled at one location.
- It is assumed that monitoring wells, 1x1 Lined Pond, and Little Rock pit bottom are dry two quarters a year
- Four surface water samplers will be checked quarterly and are assumed to be dry two quarters a year

In summary, water quality monitoring and reporting for a 30-year period includes nine groundwater monitoring wells, two seepage collection systems, four surface water samplers, Little Rock Open Pit, Sugar Loaf Spring, and McCain Spring. Pit water elevation and precipitation data will also be collected at the same time as water quality sampling.

Road Maintenance: Road maintenance costs for post-reclamation years 13 through 30 is included for the nine monitoring wells and the powerline access road. Road maintenance consists of a motor grader engaged for 12 hours prior to each sampling event annually.

~~Road maintenance for post-reclamation years 1 through 12 is covered by erosion control and monitoring costs.~~

Vegetation Maintenance: Vegetation maintenance of reclaimed areas assumes a 2% failure every year for a total of 12 years per facility, starting the year reclamation is completed. Vegetation maintenance accounts for the number of years that have already passed since reclamation was completed for items that have already been reclaimed.

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