



PEBBLE MINE: UNPRECEDENTED WASTE WATER TREATMENT REQUIREMENTS

The draft Environmental Impact Statement (EIS) for the proposed Pebble Mine estimates that it will generate an average of 6.8 billion gallons per year of waste water during operations and 11.8 billion gallons per year during closure, requiring capture and treatment. The waste water will contain metals and other pollution harmful to fish and public health.

This is unprecedented. We can find no other U.S. hardrock mining operations that capture and treat such a large volume of contaminated mine water (see the table below).

- This volume is **more than three to six times the amount of contaminated mine water treated at the nation's largest Superfund mining sites** (e.g., the Berkeley Pit and Upper Coeur d'Alene Basin) and two to four times the volume treated at the largest operating open pit mine in the U.S. (Bingham Canyon). See the impacts to water quality at these operations in the table below.
- Pebble's proposed water treatment system is highly complex and untested, and it will likely need to operate in perpetuity.¹
- In a 2012 review of operating U.S. copper mines that account for 89% of U.S. copper production, **92% failed to capture and treat mine waste water**, resulting in significant water quality impacts.²

Table 1. Comparison of annual average waste water treatment volumes at the proposed Pebble Mine with other U.S. hardrock mines with large waste water treatment volumes, and the impacts of failing to capture and treat waste water.

Mining Operation	Estimated Waste Water Treatment (Gallons/Year)	Mine Status	Impacts
Pebble (copper/gold/moly)	6.8 billion during operations ³	Proposed	At risk is the nation's largest and most productive wild sockeye salmon fishery.

	11.8 billion at closure ⁴		
Climax (molybdenum)	2.86 billion ⁵	Operating	Discharges of zinc, copper, cadmium and lead into Tenmile creek exceeded aquatic life standards, and cadmium, lead and manganese were above water supply standards. The mine, when operating, has also been a significant uncontrolled source of phosphorus to Dillon Reservoir, which supplies water to the city of Denver.
Bingham Canyon (copper/gold/moly)	2.7 billion ⁶	Operating	Acid waters, from the leaching of wastes, escaped from the collection system and contaminated the groundwater under the site. The impacted aquifer represents approximately ¼ of the potential drinking water for the Salt Lake City Valley. ⁷ A portion of the Bingham Canyon is a proposed Superfund site. ⁸ In February 2008, the United States Fish and Wildlife Service took legal action against Kennecott for the release of hazardous substances from the mine's facilities, including selenium, copper, arsenic, lead, zinc and cadmium. ⁹
Berkeley Pit/Continental Mine complex (copper/gold/moly)	1.8 billion ¹⁰	Berkeley Pit (Superfund) Continental Pit (Operating)	Acid mine drainage has contaminated groundwater, surface water and soils with arsenic and other heavy metals. It is considered one of the largest mining Superfund sites in the U.S. The pit lake contains roughly 50 billion gallons of acidic water that must be pumped and treated in perpetuity. ¹¹
Greens Creek (silver)	1.7 billion ¹²	Operating	Water quality violations for zinc and lead have occurred as a result of discharges into Greens Creek, and discharges of diesel oil and drilling mud to Zinc Creek. Surface water in Further Creek, Further Seep and Duck Blind Drain has been degraded with sulfates, lower pH and zinc. ¹³
Red Dog (lead and zinc)	1.5 billion ¹⁴	Operating	In 1989, zinc contamination from the mine lead to dead fish in the Wulik River, approximately 25 miles downstream from the mine. ¹⁵
Upper Coeur d'Alene and Bunker Hill Mine Complex (lead and silver)	0.8 - 1.3 billion ¹⁶	Closed (Superfund Complex)	Both surface water and groundwater in the Upper Basin are severely contaminated. In some places, zinc levels are over 50 times higher than Idaho's standards allow. The site is considered one of the largest Superfund mining sites in the nation.
Grouse Creek (Gold)	1.3 billion ¹⁷	Closed	Pinyon Lake and Pinyon Creek were permanently dewatered to allow construction of the tailings impoundment. ¹⁸ There have been multiple exceedances of water quality standards for cyanide and mercury due to leaks from the tailings impoundment. ¹⁹ In 2003, the Forest Service and EPA determined the leaking tailings pond an "Imminent and substantial endangerment to human health and the environment," and used CERCLA authority to pull the mine into a time critical removal action. ²⁰
Copper Basin Mining District (copper)	1.25 billion ²¹	Closed (Superfund Complex)	Acid mine drainage has polluted streams in the North Potato Creek and Davis Mill Creek watersheds and parts of the Ocoee River with high concentrations of iron, copper, manganese, aluminum, and zinc.
Summitville (gold)	1.1 billion ²²	Closed (Superfund)	A major spill at the mine resulted in the release of acid mine drainage into the Wightman Fork and the Alamosa River. The Alamosa River system below the site does not fully support aquatic life. There has been some uptake of metals in livestock, and some agricultural soil degradation from irrigation. ²³
Chino & Cobre (copper)	0.77 billion ²⁴	Operating	In 2011, the U.S. Department of Justice and State of New Mexico issued a consent decree for damages to natural resources from the Chino Mine. The investigation of natural resource injuries was



			related to the release of hazardous substances into the environment from acid mine drainage and process solution, among other sources. ²⁵ Groundwater quality exceedances: sulfate, cadmium, copper, lead. Groundwater plume is currently 13,935 acres from Chino and 528 acres from Cobre. ²⁶ The 2003 ecological risk assessment reported elevated concentrations of copper and zinc in surface water from five different drainages at Chino.
Central City/Clear Creek (gold/silver)	0.45 billion ²⁷	Superfund	Mining and milling activities resulted in the watershed becoming contaminated with heavy metals, significantly impacting aquatic life and potentially threatening human health. ²⁸
Zortman Landusky (gold)	0.4 billion ²⁹	Closed	Extensive surface and groundwater contamination in Little Rocky Mountain Range, harming agricultural lands, fish and wildlife habitat, drinking water resources and cultural lands. Acid mine drainage will require treatment in perpetuity.
Questa (molybdenum)	0.4 billion ³⁰	Closed (Superfund)	Groundwater, surface water, sediments, soils and biological resources on and around the MolyCorp site and Red River Corridor have been contaminated with heavy metals. ³¹
Tyrone (copper)	0.32 billion ³²	Operating	A 2003 risk assessment determined that surface water is exposed to hazardous substances released from the Tyrone Mine through a variety of pathways. ³³ Groundwater quality exceedances for sulfate, cadmium, and copper. Most or all the alluvial aquifers at the mine site have been injured from mining activity. The groundwater plume extends over 6,280 acres. ³⁴

¹ The post-closure plan requires contaminated water in the pit to be pumped and treated to maintain the contaminated water at a certain level within the pit. Source: U.S. Army Corps of Engineers, Pebble Project Draft Environmental Impact Statement, February 2019. p. 2-37.

² Earthworks. "U.S. Copper Porphyry Mines: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures and Water collection and Seepage Treatment Failures, July 2012 (Revised November 2012).

https://earthworks.org/cms/assets/uploads/archive/files/publications/Porphyry_Copper_Mines_Track_Record_-_8-2012.pdf

³ Average annual water treatment during operations, based on 50th percentile (29 cfs). Source: Knight Piesold Ltd., Pebble Project: Pebble Mine Site Operations Water Management Plan July 6, 2018. Table 4.2, p. 47.

⁴ Average annual water treatment during closure phase I (50cfs), based on 50th percentile Source: Knight Piesold, Pebble Mine Site – Closure Water Management Plan, September 21, 2018. Table 5.1, p. 23.

⁵ Average flow of new WTP is expected to be 5,433 gpm (or 2.856 billion gallons per year). Source: Climax Molybdenum Co. "Reclamation Permit Number 1977-493. Technical Revision TR-19." Property discharge water treatment plant (PDWTP). p. 7.

<http://drmsweblink.state.co.us/drmsweblink/0/doc/952054/Electronic.aspx?searchid=40649396-d8b8-4135-9d17-0b9514614b46>

⁶ Average of 2,600 gpm at water treatment plant for Zone A and Zone B.

Source: E-mail from Douglas Bacon, Project manager-Kennecott, Utah Department of Environmental Quality, January 29, 2019.

⁷ https://deq.utah.gov/legacy/great-salt-lake-advisory-council/docs/2011/Mar/031611_southwest.pdf

⁸ EPA website, Superfund Site: Kennecott (South Zone), Available at: <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0800601>

⁹ United States v. Kennecott Utah Copper Corporation. Complaint Case: 2:08cv00122. February 14, 2008.

www.fws.gov/.../r_r_Kennecott_Utah_Copper_ComplaintFinal.pdf

¹⁰ Currently treating 5 million gallons per day. Source: E-mail from Garrett Smith, Hardrock Mining Bureau Permit Section, Montana DEQ, January 23, 2019. Missoulain, "Treating toxics countdown begins on Berkeley Pit water," June 20, 2016. Available at: https://missoulain.com/news/state-and-regional/treating-toxics-countdown-begins-on-berkeley-pit-water/article_29d53a79-1dad-5b57-8fc5-b113a955afb9.html

¹¹ Montana Standard, Getting the Berkeley Pit Under Control: Pumping Treated Water Could Start as Soon as March," December 10, 2018. Available at: https://mtstandard.com/news/local/getting-the-berkeley-pit-under-control-pumping-treated-water-could/article_404e9d28-8931-5e34-b0d9-521b75aca267.html

¹² Greens Creek APDES Fact Sheet 4.2 at 12.

Available at; http://dnr.alaska.gov/mlw/mining/largemine/greencreek/pdf/gc_apdesfactsheet_ak0043206.pdf.

¹³ U.S. Department of Agriculture, Greens Creek Mine Tailings Disposal Facility Expansion, Draft Environmental Impact Statement, April 2012; Juneau Empire, "Two firms in Southeast Alaska pay sizeable environmental fines," June 13, 2006; Juneau Empire, "Two firms in southeast Alaska pay sizeable environmental fines," June 13, 2006; Alaska Department of Environmental Conservation, Alaska Pollution Discharge Elimination System Permit Fact Sheet, Permit Number AK0043206, Permit Issuance Date September 30, 2011.

¹⁴ Alternative B predicted that an average of 1,527 million gallons would need to be discharged annually until the year 2026 to maintain the water balance in the tailings impoundment. After that period, an average of 1,350 million gallons would need to be discharged annually. Alternative B was selected by EPA as the preferred alternative. Source: Tetrattech. Oct. 2009. Red Dog Mine Extension - Aqqaluk Project. Final Supplemental Environmental Impact Statement. Available at <http://northern.org/media-library/document->



archive/clean-water-mining/red-dog-mine/aqqaluk-final-seis/Red_Dog_Final%20SEIS.pdf.

¹⁵ Anchorage Daily News, "Toxic metals foul stream near mine," August 16, 1990; United States Environmental Protection Agency Region 10, Administrative Complaint, Docket No. 1091-02-16-309(g), February 28, 1991.

¹⁶ Current flows are between 1,500 – 2,499 gpm. *Source*: E-mail from Dan McCracken, P.E. Kellogg Remediation Program Manager, Department of Environmental Quality, January, 24, 2019.

¹⁷ <https://www.deq.idaho.gov/media/60181001/yankee-fork-salmon-river-jordan-creek-hecla-mining-company-grouse-creek-unit-npdes-401-certification-1217.pdf>

¹⁸ *Id.*

¹⁹ U.S. EPA Fact Sheet, NPDES permit Number: ID 002646-8, November 24, 1999.

²⁰ U.S. Forest Service and U.S. EPA, Removal Action Memorandum, Grouse Creek Tailings Impoundment Dewatering, May 21, 2003.

²¹ E-mail of annual treatment volume at the Copper Basin Mining Superfund Site for 2018 from Ashley Pulley, P.E., Environmental Consultant, Division of Remediation, Tennessee Department of Environment and Conservation, January 23, 2019.

²² Up to 2,100 gpm. *Source*: Denver Post, "One of Colorado's worst superfund sites has been fixed, but the State's on the hook for \$2M a year to keep it clean," July 10, 2018. Available at:

<https://www.denverpost.com/2018/07/10/colorado-summitville-mine-cleanup/>.

²³ EPA Superfund website:

<https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0801194>

²⁴ Current = 171 million gallons from Cobre Mine to Chino Water Treatment Plant + 600 million gallons per year from Chino Mine = 771 million gallons.

Source: Golder Associates. Aug. 2007. Chino Closure/Closeout Plan - 2007 Update. Basis Of Cost Estimate For Water Treatment With Comingling. http://www.emnrd.state.nm.us/mmd/marp/permits/documents/GR009RE_20081121_Chino-ClosureCloseoutPlan-AppendixD-08282007.pdf; Telesto

Solutions Inc. Aug. 2009. 2009 Cobre Closure/Closeout Plan. Prepared for Freeport-McMoran, Inc. Table C.5.

http://www.emnrd.state.nm.us/mmd/marp/permits/documents/GR002RE_20090810_Cobre_2009_Closure_Closeout_Plan.pdf

²⁵ United States and State of New Mexico v. Freeport McMoran Corporations, et. al, Consent Decree, Case 1:11-cv-01140. December 2011.

²⁶ New Mexico Office of Natural Resources Trustee. Jan. 2012. Final Groundwater Restoration Plan for the Chino, Cobre, and Tyrone Mine Facilities. Available at:

http://www.gilaresources.info/pdfs/Final.Groundwater.Restoration.Plan.Chino.Cobre.Tyrone_1.4.2012.pdf

²⁷ 250 gpm at ATWTP and 600 gpm at NCCWTP. *Source*: EPA, Fifth Five-Year Review Report for Central City/Clear Creek, November 2017.

²⁸ EPA Superfund website:

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0800257>

²⁹ Average 400 million gallons per year from 2004-2017, E-mail from Wayne Jepson, Hydrologist, Montana DEQ, March 23, 2018.

³⁰ Approximately 1 million gallons per day. *Source*: Taos News, "Success Story: Golder Associates and the former Chevron Questa Mine," January 23, 2019.

Available at: <https://www.taosnews.com/stories/success-story-golder-associates-and-the-former-chevron-questa-mine,48517>

³¹ EPA Superfund website:

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0600806#bkgground>

³² Golder & Associates. Oct. 2007. Tyrone Closure/Close-out Plan 2007 Update - Basis of Cost Estimate for Water Management and Treatment.

http://www.emnrd.state.nm.us/mmd/marp/permits/documents/GR010RE_20071011_Closeout_Plan_Update_AppendixD_Water_Treatment_Cost_Estimate.pdf

³³ Stratus Consulting, "Preliminary Assessment Screen for the Chino, Tyrone and Morenci Mine Sites, Grant County, New Mexico and Morenci, Arizona," Prepared for US Fish and Wildlife Services, June 2003.

³⁴ New Mexico Office of Natural Resources Trustee. Jan. 2012. Final Groundwater Restoration Plan for the Chino, Cobre, and Tyrone Mine Facilities. Available at:

http://www.gilaresources.info/pdfs/Final.Groundwater.Restoration.Plan.Chino.Cobre.Tyrone_1.4.2012.pdf

