Assessment Strategy for Environmental Contaminants: Water Quality and Volume Released from Two Abandoned Mercury Mines

Corona and Twin Peaks are abandoned mercury mines in the historical Mayacamas Mercury District. There are over 100 abandoned mercury mines in this region, some of which were among the largest producers in the state. Most waterbodies downstream of these mines are now listed by the state as impaired, and fish consumption advisories are posted.

Mine sites in the Cache and Putah creeks watersheds of the Inner Coast Range. The star indicates the location of the Corona and Twin Peaks mines.

Two mine adits and a drain tunnel release water high in iron and nickel to the Lake Berryessa watershed, tributary to the Yolo Bypass in the southern Sacramento Valley. Nickel is naturally enriched in the area’s soils. Adit drainages have among the highest recorded concentrations of nickel in northern California. Iron is visually evident in drainage waters.

The goals of the Corona Twin Peaks Mine Drainage Treatment Project are to render the site safe for public use and to support a healthy aquatic ecosystem downstream. Physical improvements will include implementing both in situ and

These baseline data, combined with post-project monitoring data, will be used to characterize the effectiveness of the treatment systems at reducing the concentrations and loads of pollutants in mine site runoff and tunnel drainage waters.
Over 75% of the nearly 30 different elements monitored showed no levels of concern, including some often found in California’s mining areas, at concentrations above stringent criteria.

ex situ treatment systems to reduce acidity and metals loadings from the Corona Drain Tunnel, consolidating mine waste, controlling runoff, enhancing revegetation of waste rock and tailings piles, and improving two existing infiltration trenches.

Monitored sites were selected to represent adit discharges, infiltration trench surface waters, upstream and downstream receiving waters, and other local tributaries. Sites included the three mine portals, two adjacent trenches, all nearby creeks when flowing, and some minor tributaries above. Chemical concentrations were determined (by ICP-MS as well as conventional tests) from monthly samples collected over more than an entire year, including both drought and extreme wet periods.

Photograph of the processing area near Corona and Twin Peaks mines, circa 1950, exemplifying the development of mercury mining in CA.

Instantaneous flow rates measured during the dry period 2012-2013 at portals of the Upper Corona Mine (UC), Twin Peaks Mine (TP) and Lower Corona drain tunnel (LC).
Monitored parameters included flow rates, field conditions (dissolved oxygen, pH, oxidation-reduction potential, temperature, conductivity), conventional constituent concentrations (carbonate alkalinity, hardness, major cations, sulfate, and total suspended solids), total mercury and methylmercury concentrations, and trace element concentrations (filtered and unfiltered).

While flows generally peak and decline according to rain (and snowmelt), concentrations released from the three sources vary differently: Twin Peaks adit sustains a relatively constant concentration throughout the year, with modest dilution during maximum flows, the drain tunnel (Lower Corona, LC) shows more change – with increases during the tail of the wet season, while composition from Upper Corona (UC) increases more sharply upon the start of rainy weather.

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