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Merrill-Crowe Zinc Precipitation Plants

For Recovery Of Gold & Silver From Cyanide Solutions

Economy plants with flow ranges from 10 GPM to 50 GPM

Sepor's State of Maine Mining Co. Pilot Scale and Small Production Scale Merrill-Crowe plants are manufactured in the following sizes:

050M-002 - 65 tons per day *
050M-005 - 300 tons per day *
*** Tons of solution per 24 hours.**

The plants are complete and include solution circulation pumps, flow meter for plant feed, de-aeration system with vacuum pump, deaeration tower level control with recirculation system, precipitation precoat filter, clarifying precoat filter, zinc dust hopper, zinc dust feeder, instrumentation, internal piping, steel mounted frame. All plants are for continuous operation. All that is necessary for the user to supply is piping to and from the unit, external wiring to the unit and site installation.

Merrill-Crowe Plant Specifications

CATALOG NUMBER	PLANT SIZE	SHIPPING WEIGHT (Lbs.)	SHIPPING VOLUME ($Ft.^3$)
050M-002	65 Tons/Day	1,200	135
050M-005	300 Tons/Day	3,100	300

Optional Plate & Frame FIlter Press

Note: The standard configuration of the Portable Merrill-Crowe Plant uses cannister pre-coat type filters for clarifying and precipitation filters. Plate and frame filters are available for pre-cipitation filter, as an option. The dimensional size of the plant is increased when adding the plate and frame filter by approximately 3' x 6'.

For further information about our Merrill-Crowe Plants, Contact:
Technical Sales Department

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The discovery that gold was soluble in weak solutions of potassium cyanide (mid 19th century) presented a major tool to gold miners, who could now dissolve the gold in the ore and discard the waste rock. Modern cyanide plants typically use a cyanide solution of 0.05% NaCN to dissolve gold from the ore. Following the discovery of gold's solubility in cyanide, it was discovered that passing the gold dissolved in cyanide solution through chips of zinc caused a gold to precipitate. The zinc reacts with the cyanide, and releases the gold as a solid precipitate. Early zinc precipitation systems simply used a wooden box filled with zinc chips. These systems worked, however, they were very inefficient, since much of the dissolved gold still remained in solution after passing through the zinc box. The Merrill-Crowe process was the first use of the zinc precipitation process that made the use of zinc a highly efficient gold recovery process. Primarily, the Merrill-Crowe process works so much better than the early zinc boxes because in order for efficient and complete precipitation of gold and silver from a cyanide leach solution to occur, dissolved oxygen must be removed from the solution. A Merrill-Crowe plant typically reduces the oxygen content of a cyanide solution to about 1 PPM or less. In Sepor's Merrill-Crowe plants, the de-aeration tower consists of a section of packed media to give maximum exposure of the leach solution surface to the vacuum pressure, causing dissolved oxygen to come out the solution and exit with the flow to the vacuum pump.

Another key factor in precipitating gold from a cyanide solution, is the proper mixing of the zinc dust. Our Merrill-Crowe plants provide a volumetric screw feeder to meter the correct quantity of zinc dust into a cone mixing chamber, which thoroughly mixes the zinc with the cyanide solution. In line static mixers may be utilized following the zinc feeder to assure an optimum mix. In addition, zinc requires the presence of free cyanide to be present in order for it to dissolve rapidly in a cyanide solution. So, occasionally, a little NaCN will be added to the zinc dust feeder to ensure the presence of free CN when the zinc is added. In addition to cyanide, lead nitrate is added to the zinc mix chamber to aid in the recovery of the gold precipitate.

The amount of gold dissolved in the cyanide solution is usually no more than 0.10 ounce per ton of solution. For silver, the amount of silver in the cyanide solution could be as high as 10 ounces per ton of solution. The quantity of zinc required to precipitate the gold or silver from the cyanide solution is directly related to the amount of gold or silver in the solution. Sepor's zinc dust feeders have a variable feed rate, to vary the amount of zinc required for various solution operation conditions.

Sepor's Merrill-Crowe Plant Operation:

1. **The pregnant solution is pumped to the clarification filter, which is a cannister precoat type filter, and this filter removes undissolved solids from the solution. The pregnant solution pump is not included with Sepor's Merrill Crowe plant, but one may be provided as optional equipment.**

2. **The filtered pregnant solution flows through the de-aeration chamber, having 4-8 PPM of the oxygen removed. Water (and CN Solutions) typically has between 6 – 8 ppm dissolved oxygen in it.**

3. **The filtered, deaerated pregnant solution flows through the zinc mixing chamber, where zinc dust, CN (if required) and lead nitrate are added.**

4. **The Precipitated solution is pumped by means of a centrifugal pump (which ensures a thorough mixing reaction) to the precipitate filter, which is a cannister precoat type filter. An optional plate and frame filter may be used for the precipitate filter.**

5. **The gold precipitate is trapped in the precipitate filter, passing the barren solution to a pond or storage tank for reuse or further processing. On the plants with the cannister type precoat precipitate filters, two filters are used. When one filter is being cleaned of the gold precip, the flow is diverted to the other precipitate filter. Typical precipitates from the filter of the Merrill-Crowe plant will range from 45% to 85% gold.**

The precipitate from the Merrill-Crowe plant may be fluxed and melted (if the assay is high enough), or it may require further treating, such as re-dissolving and eletrowinning, acid treatment, etc..