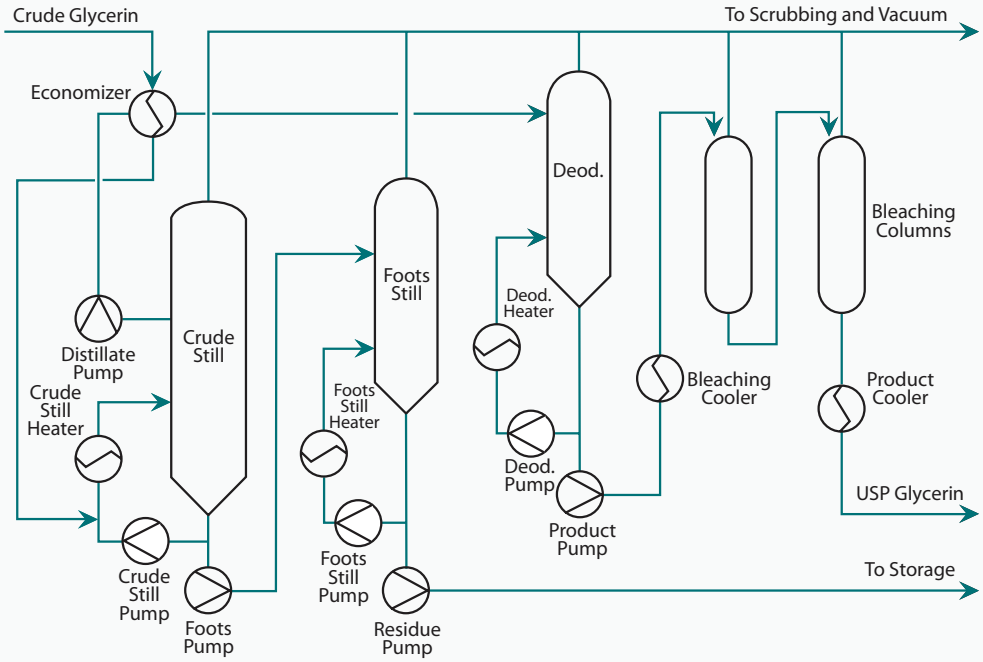
# CPM Crown's Thin Film Evaporator

## Thin Film Evaporator Flow Diagram





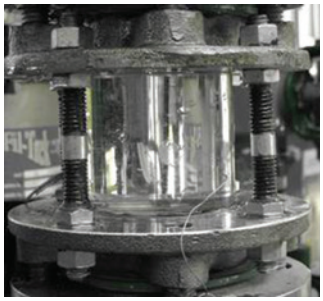

## ABOUT CPM CROWN'S THIN FILM EVAPORATOR

The standard foots still system provided with the typical Crown glycerin system generally provides a most cost-effective means of treating residue. Residue discharged from the crude still generally contains about 65% - 75% glycerin, and the foots still can recover most of this as product. Pitch discharged from the foots still typically contains around 25% residual glycerin, depending upon the salt and MONG levels. This 25% pitch is normally discharged as a toffee-like material, used as a feed supplement or disposed of as a solid material.

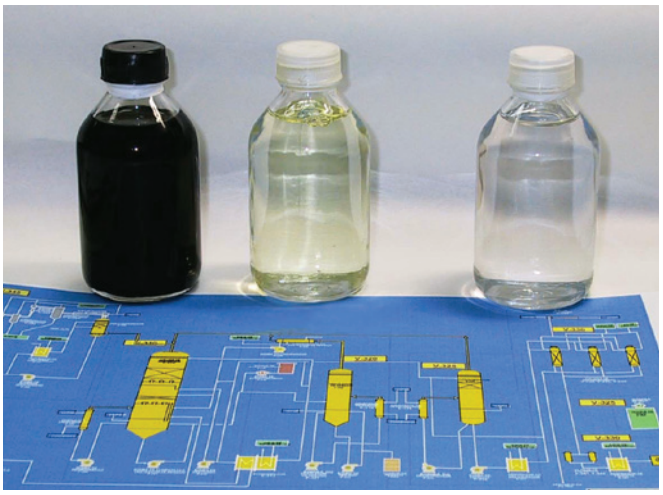
For larger capacity plants, or crudes having a high amount of salt content, a thin film evaporator, (TFE) may provide a better solution. Although this TFE system is more expensive than the standard foots still and uses more utilities, the material discharged from the TFE will contain less than 3% residual glycerin. This can often boost the overall efficiency of the glycerin recovery system to over 99%.

The heavy fraction from the crude still is continually discharged by the foots pump, which delivers the glycerin-laden residue (foots) to the TFE. This measurement of foots flow is used to automatically set the flow of phosphoric acid from the phosphoric acid pump through the static mixer. In this manner, acid is delivered in a proper amount based on the residue flow rate.

In the TFE, the feed stream is continually vaporized under high vacuum and mechanical agitation without color formation and product degradation. The required heat is supplied by high-pressure steam or thermal oil on the jacket side. Due to the rapid surface renewal and short residence time the evaporator operates with high heat transfer rates while product purity and yield are maximized.







## For ongoing innovation, Crown's technology and team are second to none.

CPM Crown's Global Innovation Center is a facility unlike any other. A fully functional 15,000 sq. ft. pilot plant, analytical lab and training facility, the GIC offers piloting capabilities from benchtop lab scale to multiple tons per day of continuous production, simulating real life and enabling customers to develop and test new product concepts in a confidential, controlled environment. The GIC has capabilities in preparation, extraction, desolventizing, drying, deodorizing, refining, fat splitting, renewable diesel and specialty extraction (including Hemp CBD Oil). Crown's technical expertise, R&D and full lifecycle process provide guidance and support at every step from feasibility, trials and custom processing to commercial-sized operations and aftermarket.

The vapors pass to the TFE condenser where the bulk of the glycerin is recovered and returned to the crude still. Any light ends driven off the condenser are transferred along with the exhaust motive stream to the vapor scrubber by using the thermocompressor. In this way the entrained glycerin is recovered as a substandard product.

Vapors passing through the packing flow to the vapor scrubber where they are condensed and sent to storage as substandard glycerin. Any non-condensable vapors are discharged from the process through the vacuum system.

The material remaining in the TFE is concentrated, generating a residue which accumulates in the vacuum lock vessel. Periodically the vacuum lock vessel is isolated and the residue is discharged typically as a dry salt product.






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