

## Overview

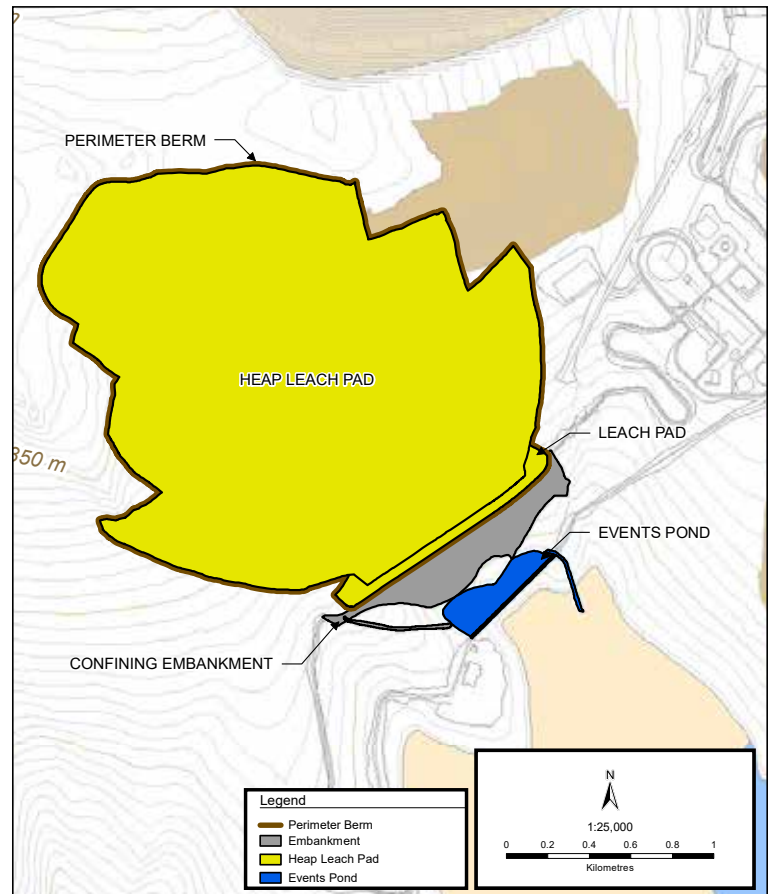
The Casino Project will produce two types of ore: sulphide ore and oxide ore. While the sulphide ore goes to the mill, the oxide ore, which contains more gold than copper, goes to the Heap Leach Facility (HLF). A heap leach is where ore is crushed to a small size and stacked on a liner system. A chemical solution containing cyanide is dripped over the ore which releases the gold and other minerals.

Casino's HLF is designed to hold 210 million tonnes of ore with approximately 25,000 tonnes of ore stacked everyday. The HLF will be stacked in 7 stages over the life of the mine. Construction of the HLF begins in Year -3, and the first layer of ore is stacked in Year -2. This means that the HLF is working while the mill is still being constructed. Year 22 is when the last ore is stacked on the HLF and closure activities for the HLF begin.

## International Cyanide Management Code (ICMC)

Casino will comply with the International Cyanide Management Code (ICMC). The ICMC is a voluntary certification program for companies that make, transport, and use cyanide in the production of gold and silver. It helps companies improve their management of cyanide in order to limit risks to human health and the environment.

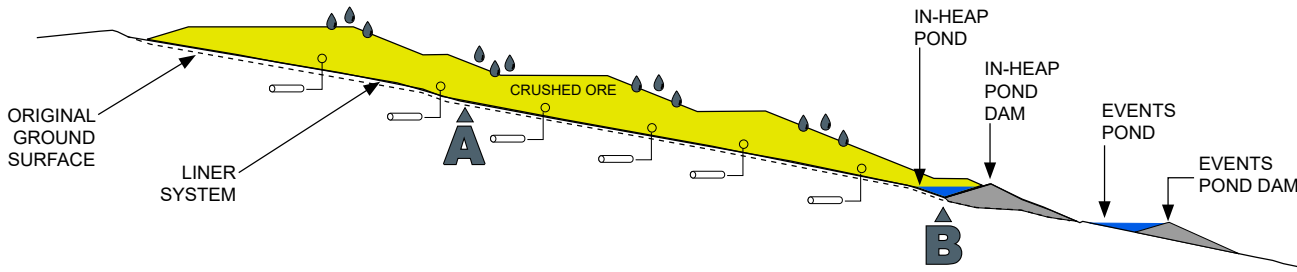
## Key Parts of Casino's HLF


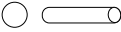








## How does Casino's HLF work?

1. Oxide ore is delivered to the crushers by truck, where it is crushed to increase surface area of the rock so that more solution can touch the minerals to release them.
2. Crushed ore is stacked onto the heap leach pad by conveyors.
3. A cyanide solution is applied to the first layer of crushed rock. At this stage, the cyanide solution doesn't contain any gold and is called barren solution.
4. The copper, gold, and silver in the crushed ore dissolves into the solution. The solution is now called pregnant solution. It is collected in the liner system and drains into a tank.
5. The gold and silver are recovered by the adsorption-desorption-recovery process. This is where the pregnant solution is filtered through carbon which attracts and absorbs the gold and silver. At the end of this process, gold and silver doré bars are produced.
6. The pregnant solution then goes through the sulphidisation-acidification-recycling-thickening process. This removes any potential copper that might be present.
7. Once the first layer of crushed ore has completed this cycle, another layer of rock will be added. Barren solution is then reapplied to the heap leach pad to repeat the process.
8. When the final leach cycle is done, the ore heap will be closed through a process to remove all traces of the cyanide solution in the pile.
9. A HLF is called a closed loop system, which means all solution is recycled and not released into the environment until the end of the HLF life, or at year 22 for the Casino Project.

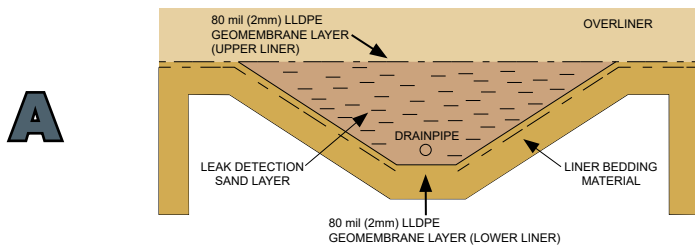
## Cross Section of the HLF



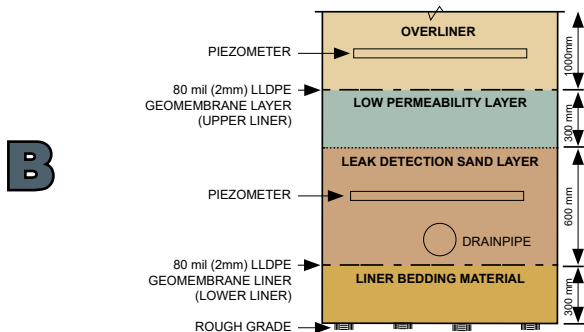
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**Application System** Applies the barren solution on top of the stacked ore. It uses a system of pipes that drip the solution to avoid evaporation of the solution.
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**Collection System** System of pipes and sumps used to collect the pregnant solution.
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**Perimeter Berm** Uses ditches around the heap leach pad to catch excess water and divert it away from the HLF. It also keeps the solution contained.
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**In-Heap Pond** The area behind the In-Heap Pond Dam and underneath the stacked ore. It is where pregnant solution and storm water may collect.
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**In-Heap Pond Dam** Improves stability of the heap leach pad and collects and stores solution before it is further processed to recover the gold.
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**Events Pond** Collects storm water in the event there is excess water.
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**Events Pond Dam** Improves stability and provides a dam for the Events Pond.
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**Liner System** Layers of plastic liner called Linear Low-Density Polyethylene (LLDPE) and compacted soil used to maximize collection of solution and minimize leaks.

## Leak Detection and Recovery System (LDRS)

The LDRS detects and removes fluids that may leak through the upper liner. The LDRS uses equipment called piezometers, placed in the overliner and leak detection sand layers, to measure water pressure in the lower liner. This helps confirm if fluids are building up within the liner system. If fluids are building up in the LDRS because of a leak in the upper liner, they are automatically pumped out. Leaks will be detected by monitoring the pumping records. Potential leaks through the upper liner would also be detected during visual inspection of where the LDRS drains into a sump and is collected.



In single-lined areas of the heap, should fluids pass the liner as a result of damage or holes in the liner, they are collected in the leak detection sand layer underneath the LLDPE geomembrane liner. Collected fluids then drain to the in-heap pond and are recovered with the pregnant solution. The Single-liner System is used on the upper slopes of the heap leach pad.



In double-lined areas of the heap, should fluids pass the top liner layer, they are collected in the low-permeability and leak detection sand layers that are sandwiched between LLDPE geomembrane liners. The collected fluids will drain to sumps which are then pumped to the in-heap pond and recovered with the pregnant solution. The Double-liner System is used on the lower slopes of the heap leach pad where solution is more likely to collect.