

Duntroon Quarry Operations Fact Sheet: Operations

August 2008

Understanding quarry operations is important in understanding and controlling environmental impacts. This fact sheet describes the general operations of the Duntroon Quarry and outlines some of the things that we do to control environmental impacts. We are constantly seeking new and innovative ways to improve our operations in ways that benefit the environment, our neighbours and our business. Please continue to ask questions, raise concerns and share ideas.

Stripping

The operation of a quarry begins with stripping the **overburden** (the soil and subsoil above the bedrock). The overburden is stripped with an **excavator**, and is placed in large dump trucks known as **haul trucks**. Haul trucks are designed for earth moving across rugged environments.

The overburden, once removed, is used to create **noise attenuation berms**, is directly placed to achieve progressive and final rehabilitation, or is stored on site for future rehabilitation needs.

Soils are removed in phases to allow vegetation and groundcover to remain intact as long as possible, which minimizes soil erosion and dust impacts.

At Duntroon there is approximately two metres of overburden over the rock (although this is variable across the site). The surface characteristic of the overburden does not necessarily reflect the contour of the rock once the overburden is removed.



Haul truck.



Drill.



Blast.

Drilling

After the overburden is stripped, the rock is fractured through blasting. The quarry uses a four-inch **hammer drill** to drill the holes to load the explosives. The drill works on the top of the rock face and drills vertical holes in an appropriate blast pattern for fracturing the rock. It drills approximately 19m into the rock, using hydraulics rather than air compression. The hammer is located on top of the drill; as a result, the drill can be a source of nuisance noise.

The drill bit is made of carbon steel. The drill uses air to blow the drilling fragments out of the hole. The coarser fragments fall out at the top of the hole. The finer fragments are collected in a dust collector, like a fabric vacuum bag, and deposited at the back of the drill.

After being drilled, the holes are protected from stormwater and debris with cup-like hole plugs to ensure integrity when the explosives are loaded.

Blasting

Blasting is the most efficient way to fracture rock for processing. For more information about blasting, please refer to our blasting fact sheet. The blasted rock is called **muck**. Rocks in the muck pile larger than our process can handle are sold for landscaping and erosion control. They may also be broken down using a hydraulic hammer on an excavator so they fit into the primary crusher opening.

Transfer

A **face loader** is used to transfer the rock from the muck pile to a haul truck. The face loader has a spade bucket equipped with teeth to efficiently penetrate the muck pile and load the rock. The haul truck transports the rock from the face to the processing plant. The loader bucket is sized to be able to efficiently load the haul trucks with only full buckets. It takes about 3 buckets to load one of our haul trucks at Duntroon.



Top: Spade bucket with teeth. Above: Haul truck and face loader.



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Processing Plant

The processing plant is made up of a series of **crushers** and **screens**. The crushers are used to further fragment the rock either by compression or impact and the screens are used to separate the stone by size.

The **primary crusher** is a **compression Jaw crusher** and is the first step in the processing plant. Haul trucks bring the rock from the muck pile and back into the crusher to unload. There is a **grizzly screen** that allows smaller rocks to pass through and continue through the process. The jaw crusher crushes the larger rocks. A hydraulic hammer is used to break up rocks that do not pass into the crusher. The operator monitors the crusher from the control room.

From the primary crusher the rock moves by conveyor to the **primary screen**. Granular products are made here. Any oversized material goes to the **secondary crusher** which is a **compression cone crusher**, to further fragment the rock.

From the secondary crusher, rock is screened to separate it into different sizes. Depending on the size of the stone it moves on different conveyors for further processing or for sale. Oversized rock from the secondary crusher is sent to the **tertiary crusher**, which is a **vertical shaft impact crusher**, and is then returned to the screen deck for sizing.

Transfer or **drop points** are where stone drops from one conveyor to another, from a screen to a conveyor or from a crusher to a screen. Walker lines transfer points with rubber to deaden the noise of stone dropping. Old conveyor belt are reused for this purpose.

The screens vibrate to separate stone into different sizes. The biggest screen is on top and there are typically four stages of sorting by each screen. The different sized stone drops out of the screen at different points, each with its own conveyor. The discharge chutes are staggered at the point the rocks drop out so that rock is dropping on rock rather than rock dropping on steel to reduce noise. The screens are changed depending on the type of products being made.



Drop Point.

Stockpiles

Walker builds the stockpiles to minimize dust emissions. The heights of the stockpiles are kept below the level of on-site berms. Stockpiles of finer material are stored away from our property lines.

Walker designs the plant and stockpiles so that highway trucks coming to pick up stone products can drive to the pile, be loaded and drive away from the pile without backing up so there are no back-up alarms heard. The operation is also designed for safety by physically separating the highway trucks that come in to pick up stone products from the quarry off-road haul trucks.



Weigh scale.

Wash Plant

Material to be washed to produce clear stone and sands is directed to the **wash deck**, where water sprays over the material, removing the fines. The water with the fines flows from the wash deck to a tank where it is collected and then pumped to the **slurry** or **settling pond**. The fines settle out in the slurry pond and the water is re-circulated back to the wash plant where it is reused.

The water used in the wash plant is continuously re-circulated. Water that evaporates or travels out with stone product is made up in the wash plant from the dewatering pond.

Shipping

A **shipping loader** is used to load product onto road trucks to be shipped to customers. Unlike the face loader, the bucket on the shipping loader is a straight edge and has no teeth. There is a **scale** on the bucket so that it can weigh product as it is loaded. These scales allow the operator to properly load the vehicle ensuring the weights on the axles are consistent with Ministry of Transport (MTO) weight restrictions.

Vehicles are also weighed on a **weigh scale** as they exit the quarry. The scale provides an accurate weight of product being sold. They also confirm that the truck meets MTO weight requirements.



Primary crusher.



Screen.

Conveyor.



Stockpile.