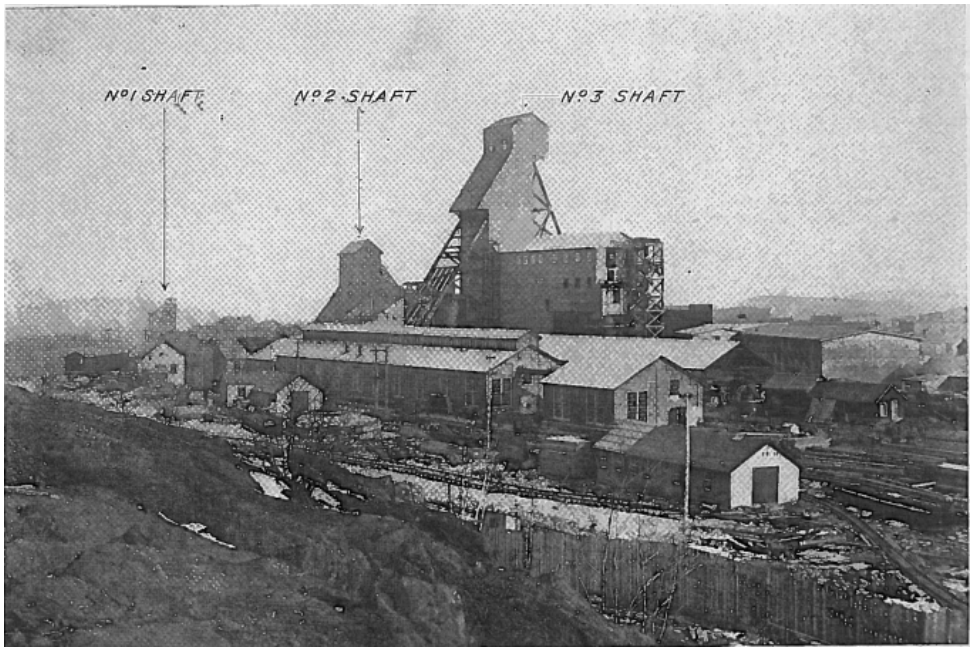
CREIGHTON MINE

#3 SHAFT



November 21/1916

June 21/2014

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Introduction:

Creighton Mine began production in 1901 as an open pit. By 1905 open pit mining has ceased and Creighton was hoisting muck from #1shaft at a bottom depth of 360' and #2 shaft at a bottom depth of 800'. Both #1 and #2 shaft are inclined at approximately -55 degrees. The mining method at that time was a combination of square set and sub level cave.

By the end of World War 1; #3 Shaft inclined at -55 degrees and a bottom depth of 1900' was in full production. The #3 Shaft complex produced almost uninterrupted until 1991. The mining method in the upper levels of #3 shaft was primarily conventional sub level cave and moved to mechanized sub level cave with the advent of rubber-tired mining equipment. Nearing the end of it's mining life; the deeper sections of #3 shaft were mined by VRM and shrinkage method.

In 1950; #7 shaft was commissioned. This is a vertical shaft 1900' deep and was outfitted only with skips and eventually hoisted all the muck coming from #3 Shaft complex.

In 1965; #9 Shaft is collared approximately 3000' North East of #3 Shaft.

Because it was recognized that #3 shaft was deteriorating and a risk to the business ; a ramp from surface was collared in 1967. By 1971 all the #3 shaft workings from surface to 1900 Level were accessible via ramp and all hoisting from #3 Shaft ceased. The ramp has since been extended to a depth of 2600'.

The #3 Shaft pit is the result of subsidence from sub level caving that took place. The broken mass of rock extends from surface to below 1500 Level.

Currently Creighton #3 Shaft ramp is maintained for the following critical reasons:

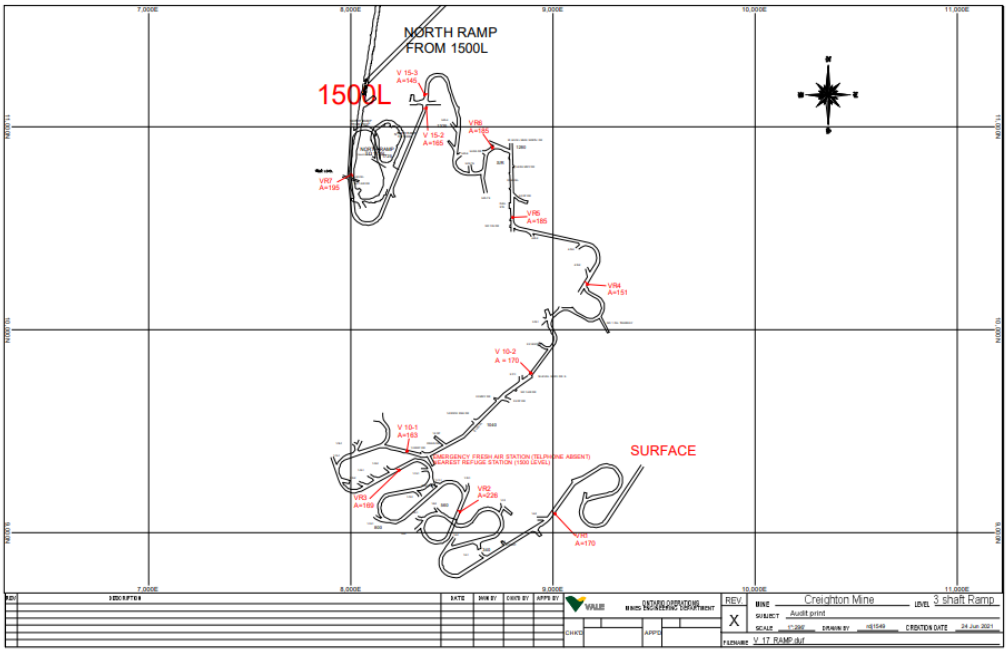
1. The ramp from 2600 Level to surface is a critical artery in the escapeway system from Creighton #9 Shaft (Shaft bottom 7130', current mining depth 8460 Level and current plans to mine below 9700').
2. The ramp is the only access to the 1900 Level pump room. Process water from #9 shaft passes by 1900 on it's way to surface.
3. The ramp is used to access primary ventilation fans on 1420, 2300 and 2600 Levels.
4. The ramp also serves as an access to the Natural Heat Exchange Area (Ice Fields). The Natural Heat Exchange Area is the equivalent of an 18-Megawatt Heating and Refrigeration plant with near zero energy costs. Air drawn through the caved area is warmed in the winter and cooled during the summer. Because of it's effectiveness; air currently being delivered to 8330 Level only averages 32 deg Celsius and mechanical refrigeration is differed until at least 8720 Level.

Mine Location:

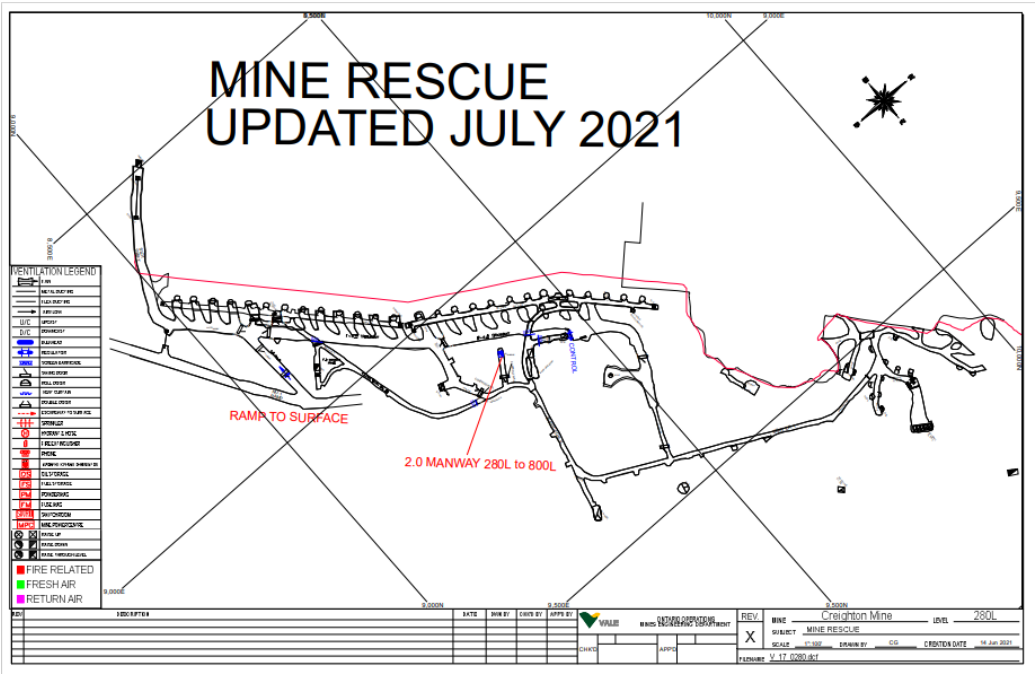
Creighton Mine is located within the City of Greater Sudbury near the town of Lively. It is an approximate 30 to 40 minute commute from downtown Sudbury.

Mine Level Plans:

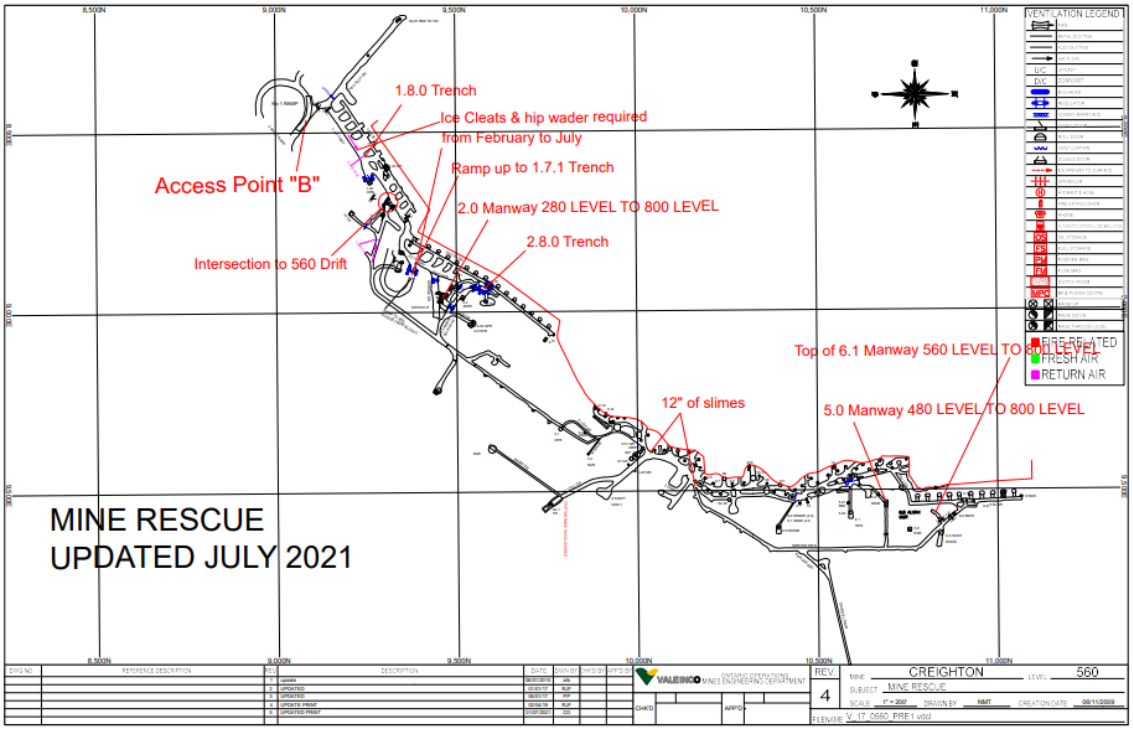
Ramp:



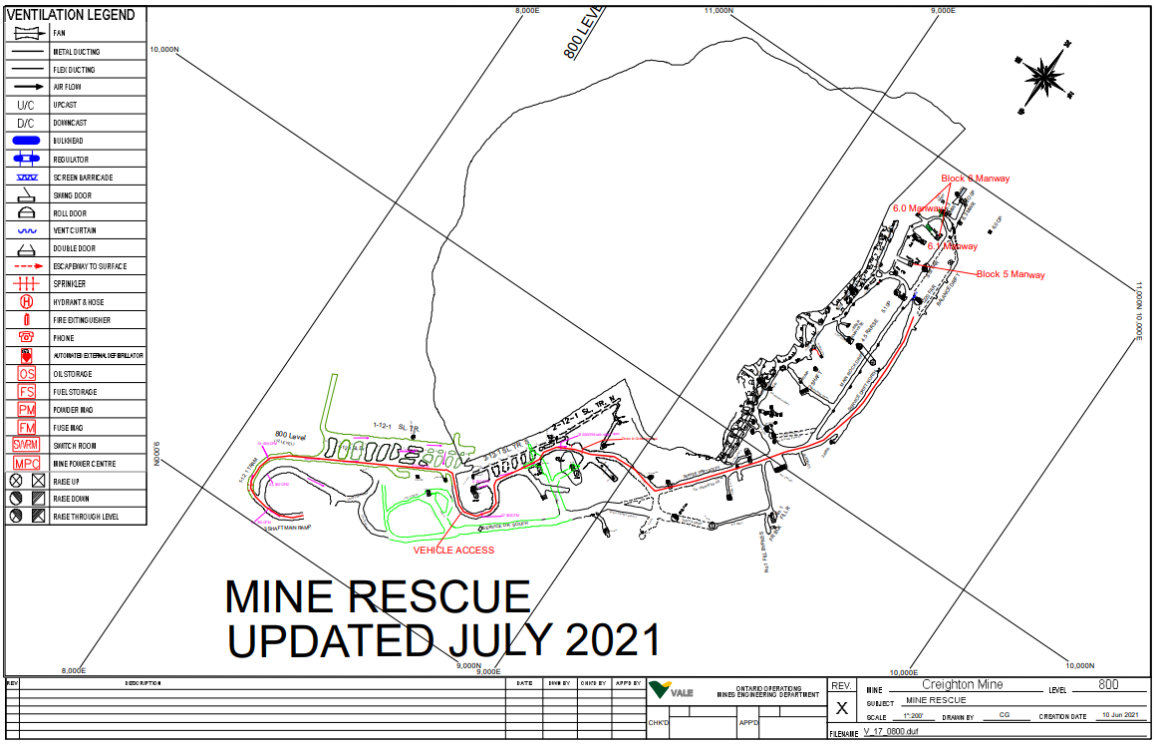
280 Level:



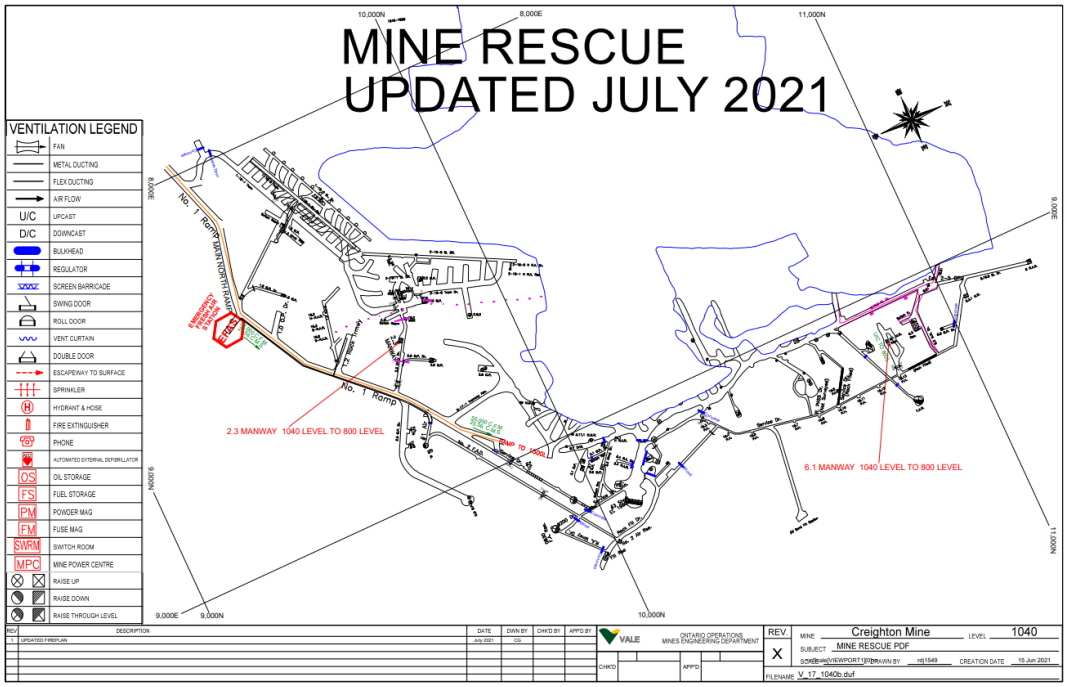
560 Level:



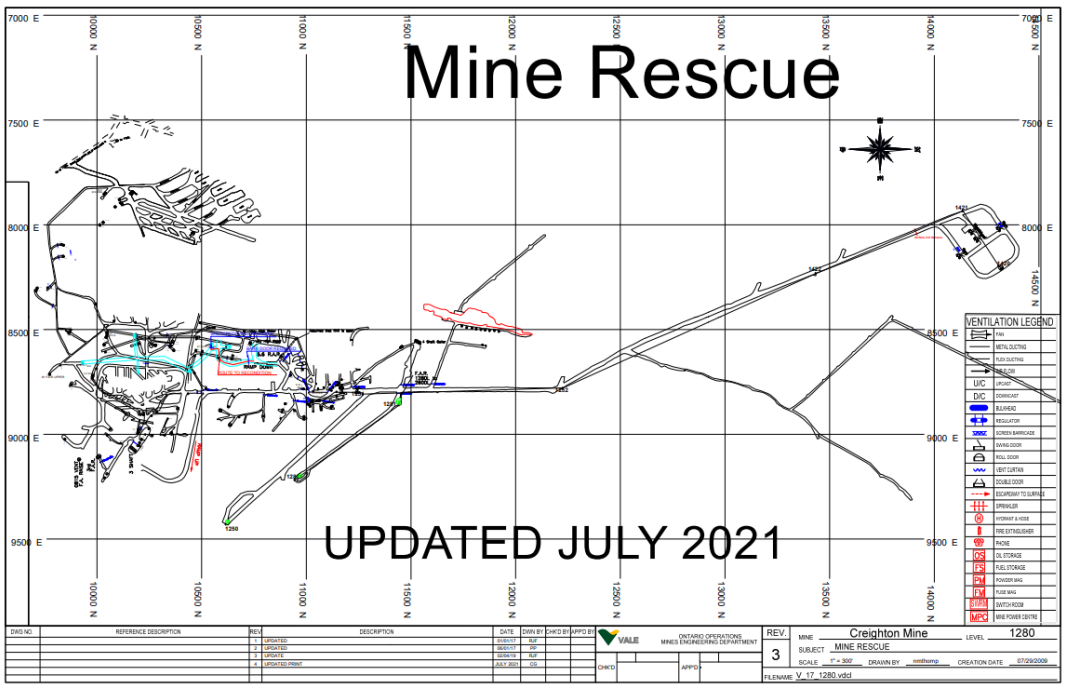
800 Level:



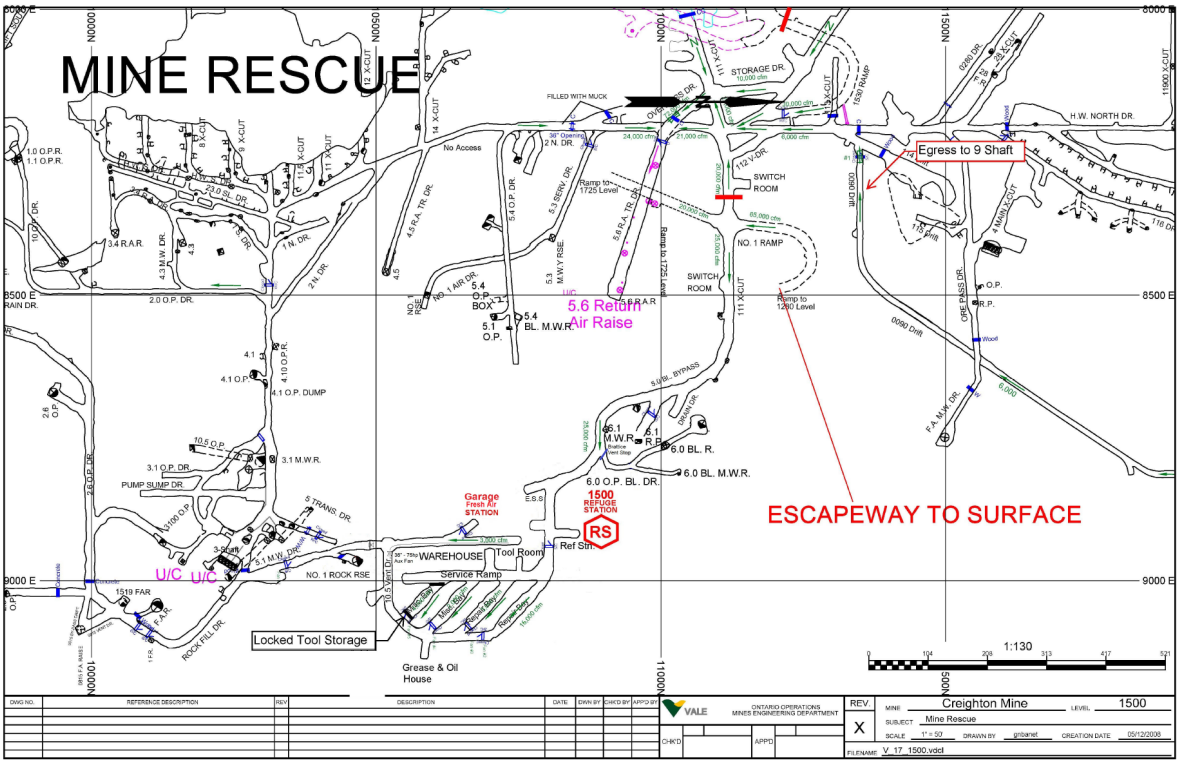
1040 Level:



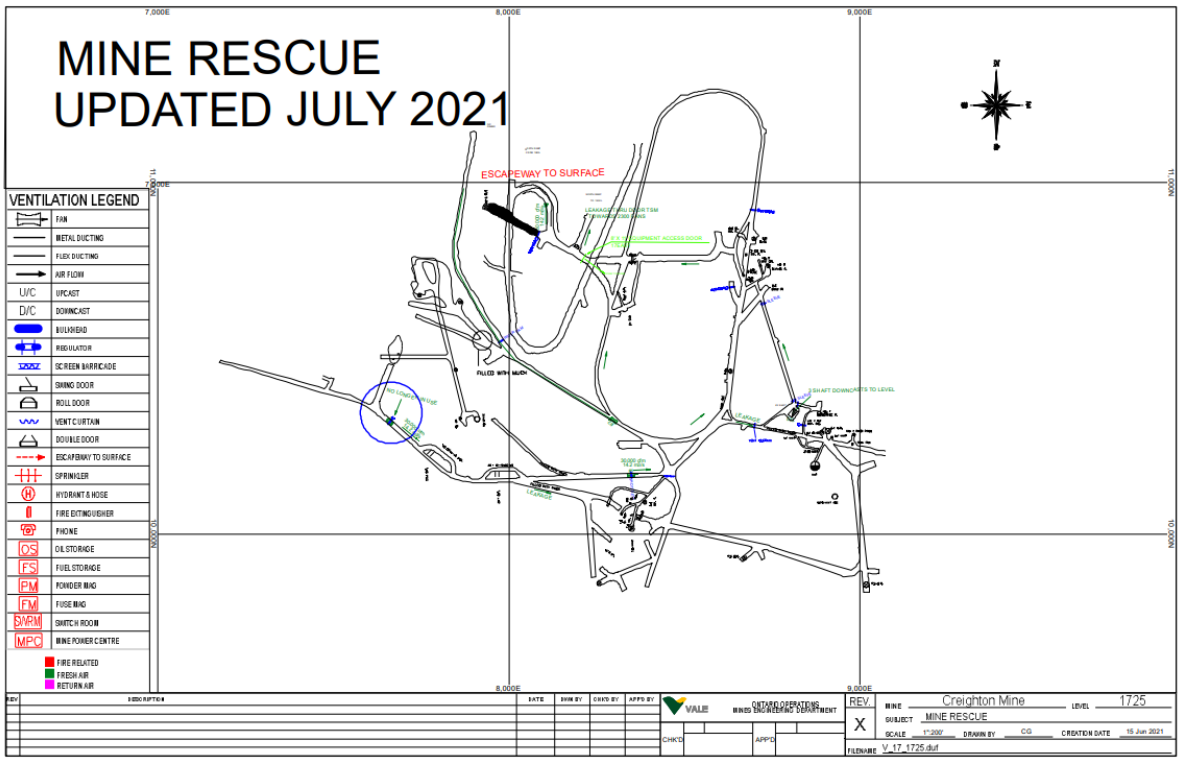
1280 Level:



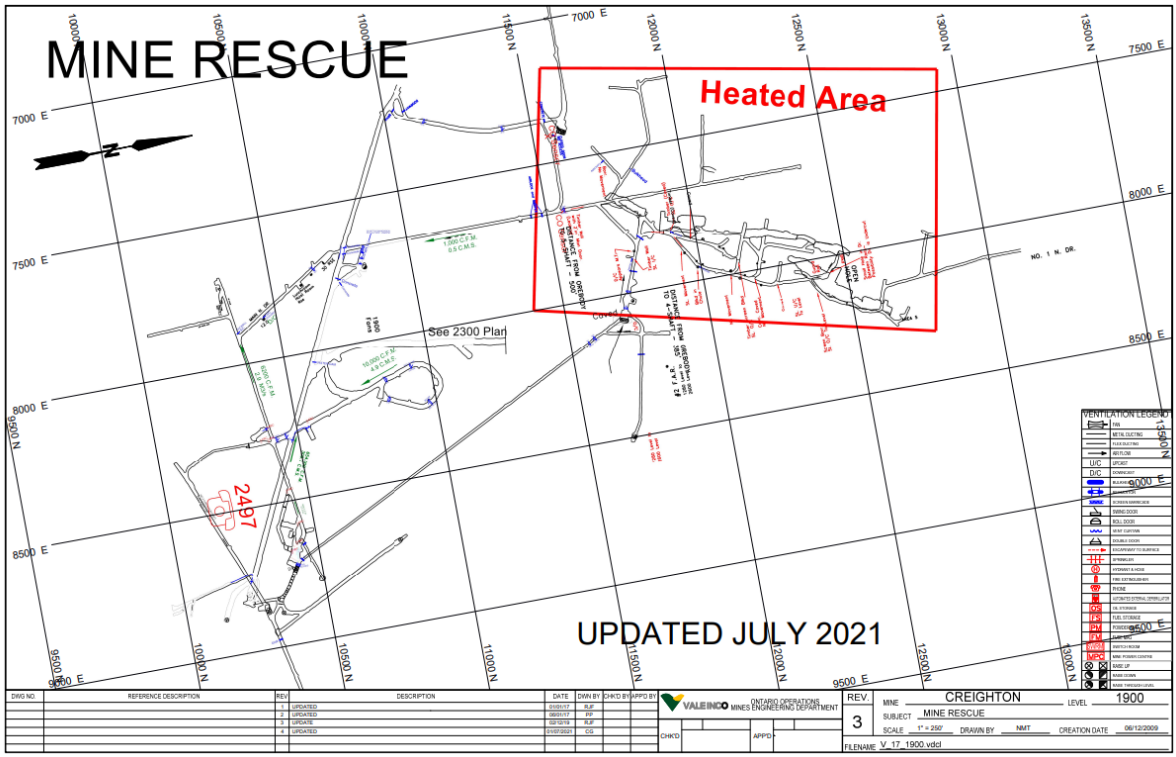
1500 Level:



1725 Level:



1900 Level:



Ventilation:

Creighton #3 Shaft is ventilated independently from #9 Shaft and is isolated from the Natural Heat Exchange Area. The ramp is ventilated as such:

1. Surface portal: 1 Joy 72-26-1170 rpm, series 2000, 125 hp fan blade setting 5. 70 000 cfm surface 1500 Level. One 12 MMBtu/Hr natural gas heater is for winter use at the surface fan only.
2. 1725 Level: 1 HVT 54-26-1200 rpm, series 2000, 40 hp fan blade setting 4 which draws air from the bottom of the caved area. 25 000 cfm 1725 Level – 1500 Level.
3. 1500 Level: 2 HVT 54-30-900 rpm, 30 hp ½ bladed fans, blade setting 3.5. 100 000 cfm 1500 Level – surface via 5.6 RAR.
4. 1500 Level garage: 36-26-1800 rpm, 20 hp fan located downwind of the garage. The airflow makes it's way past the garage to the 5.6 RAR via abandoned workings.

The ramp from 1900 Level to 2600 Level are also Fresh Air transfers for #9 Shaft's primary ventilation system(s).

A metered stench system with panels installed on surface and 1725 Level can be activated remotely in the event of fire.

This system consist of a surface injection panel with 2 banks of one 100-gram bottle @ 240 psi each, **ZACON PRODUCT # MWD-100-E-134A-SC-240** and one injection panel installed on the ramp just above 1725 Level with two banks of one 100-gram bottle. These systems are metered such that the entire contents of the stench bottles are injected over a period of 20 minutes.

NOTE:

It has been confirmed through testing that the 5.6 RAR is compromised, and all the ramp return air is making it's way into the #9 Shaft ventilation systems and not surface. Studies are currently in the works to determine the optimum location for replacement.

Emergency Fresh Air Stations:

560 Level- 1-7.2 Trench (Equipped with 4 x Jumbo Air Cylinder)

560 Level – 1-8.0 Trench (Equipped with 4 x Jumbo Air Cylinder)

1040 Level. This is equipped with 5 x Jumbo Air Cylinder. It is a refuge station; but is lacking a working telephone and only has radio communication.

1500 Garage- This is equipped with 5 x Jumbo Air Cylinder. It is a refuge station; but is lacking a working telephone and only has radio communication.

Refuge Station:

1500 Level. Equipped with 5 x Jumbo Air Cylinder, 1 backboard and stretcher, 1 First Aid kit, 1 AED, drinking water, portable toilet and privacy tent. It also serves as a lunchroom.

Telephone # is: 705-692-2621.

Air and Water:

Currently there is no compressed air or water. When required; portable diesel compressors will provide compressed air and water is brought to location in 1000 Liter cubes and delivered via pump and hose. Plans are in the works to have compressed air and water available by June 2022; but it currently unclear when the actual date of commission is.

Electrical:

Electricity is available throughout the ramp system. Feed comes from both the surface portal and #9 shaft.

Fire Procedure:

As described in UNDERGROUND FIRE PROCEDURE 17EMER02 EQUAL CODE SA213

Communications:

There are working telephones on 1500 Level. Radio communication exists throughout the ramp and on certain levels.

Fuel Storage:

There is a fueling station on surface and when required; temporary fuel and oil storages are established.

Garages and Shops:

There is an inactive garage on 1500 Level. This garage excavation serves as a staging and storage area for construction crews currently repairing and maintaining ventilation controls in the Natural Heat Exchange Area.

Whenever possible; equipment maintenance and repairs are done in the surface garage at #9 Shaft.

Blasting:

No explosives are stored at #3 Shaft. On rare occasions when blasting will take place; a procedure is drawn and reviewed by all affected.

Hazards and obstructions:

Outside of the main ramp, many hazards exist. Nobody is to travel alone and it is best to have a guide with knowledge of the area.

Transportation:

Transportation of personnel is done using Toyota Land Cruisers, Mine Cats and ROKION Battery Electric Vehicles. There is also an assortment of rubber-tired equipment as needed by construction crews. #3 Shaft workings can be accessed from #9 Shaft via 1420 or 2300 Levels.

People Working:

Monday to Thursday day shift there are approximately 20 construction people (company and contractors).

All other times: the ramp is either unoccupied or minimal maintenance and ventilation people may be present.

In some instances, people may hold Mine Rescue and/or First Aid qualifications.

Other information:

Creighton Mine also has a HEATED AREA. The heated area stretches from 1900 Level to 5400 Level North of the cave hanging wall(#5 Shaft and #6 Shaft Winze). This is a consequence of pyrrhotite backfill in old square sets. Though it is impossible to extinguish this fire; it is contained, under control and constantly monitored with fixed CO monitors. Any access to the heated area is restricted and any smoke or emissions are directed directly to surface via #11 Shaft exhaust.

Fire Fighting Equipment:

1	x	100-gallon Compressed Air Foam Unit stored at #9 Shaft warehouse. Jumbo air cylinders are caged outside of # 9 Shaft headframe along with all other compressed gasses.
1	x	150 lb wheeled Fire Extinguisher stored at #9 Shaft warehouse
		Multiple 10 and 20 lb Multi Purpose Fire Extinguishers stored in #9 Shaft headframe and at strategic locations throughout the mine.

Mine Rescue Equipment:

(Stored in the #9 Shaft Sub Station (705-692-2209) and cargo trailer outside the station)

11	x	BG4
2	x	Sets of Standard Equipment
4	x	SSR 90 M
1	x	Carevent
1	x	6100 Test Kit
1	x	Isolation Kit
3	x	Basket complete
6	x	BG4 cylinders
1	x	Dryer
1	x	Tote of filters & Seals
10	x	Pail of Soda Lime

1	x	Freezer
2	x	Fill Stand
1	x	Jug Ecolab
2	x	KED
2	x	Ferno Head Restraint
2	x	Additional Sets of Splints

Additional Mine Rescue Equipment:

1	x	Rope System
2	x	Sked
2	x	Spek Pak
1	x	Additional 500’ main and 500’ Belay line.
1	x	Assortment of additional prussik, carabiners.
2	x	Reciprocating Saw
1	x	Lifting Bag System and Cribbing
2	x	12” x 12” lifting bags
1	x	Hurst Cutter
1	x	Thermal Imaging Camera
3	x	Tool Chest (Assorted hand Tools)
2	x	Lengths of Fire Hose
2	x	Fire Nozzle
3	x	Pail of Foam