

Kidd Operations – Mine Site 2025 Ontario Mine Rescue Provincial Competition Mine Description



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1.0 Introduction

Kidd Operations located in Timmins, Ontario is comprised of the Kidd Mine Site and the Kidd Met Site. The Mine Site is located north of Timmins while the Met Site is located east of Timmins. A 31 km rail line connects the two sites for ore transportation. The Kidd orebody was discovered in 1963 by Texasgulf Incorporated and production began as an open pit in 1966. In the 59 years Kidd Mine has been in operation, approximately 170Mt of copper and zinc ore have been mined and it is the deepest base metal mine in the world.

Underground development began in 1969 with #1 Mine which operated between the bottom of the Open Pit at 800L to 2600L. #2 Mine began operations below #1 Mine in 1978 with the completion of #2 Shaft to 5000L, which is still used today as the main transport from surface to underground for people and materials, and as the production hoist for all ore to surface. #3 Mine was developed starting in 1990 with an internal shaft from 4700L to 6900L which operated until 2008 when #4 Shaft became the main hoist for both the new #4 Mine and the remaining #3 Mine reserves. No. 1 and 3 Shafts have had all conveyances decommissioned and now are only used as main ventilation intakes.

#4 Mine or "Mine D" (and the remaining active levels in No. 3 Mine) currently produce approximately

3500 tonnes per day using a transverse open stope mining method with paste backfill. Active mining is occurring from 6000L to 9800L serviced by the main ramp and an internal shaft from 4700L to 9600L. As part of an expansionary project beginning in 2020, an exploration decline was driven to 10200L to support feasibility study diamond drilling. Preproduction development on both the 9900 and 10000 L was halted because of several large magnitude damaging rockbursts, and all access below 9800 was closed off in late 2024 following a project decision to focus on mining current reserves and close the Kidd Mine Site at the end of 2026. The ramp extension, 9900 and 10000 Levels are being allowed to flood.

Figure 1 - Kidd Longitudinal Section showing main infrastructure and production levels with CN Tower for scale.



2.0 Mine Site Location

The Kidd Mine Site is located 28km north of Timmins via Highway 655 and the Kidd Met Site is located 24 km east of Timmins on Highway 101. The Mine Site is approximately a 27 minute drive from the Timmins City centre.



Figure 2 - The location of the Kidd Mine Site (circled in red) and Met Site (circled in blue) with approximate interconnecting rail line (green line).

3.0 Level Designs

Typical production levels were driven from the main ramp with a short level access, a footwall drive (01 DR) that runs northwest to southeast along strike of the orebody and crosscuts that intersect the orebody oriented northeast to southwest for production mining activities. Almost every level was constructed with a refuge station located in the access drive, with ore passes, ventilation and water management infrastructure located along the 01 DR, including sumps, electrical substations, etc. The paste fill, process water and compressed air lines are hung along the back of the main footwall drifts, with auxiliary piping routed into the crosscuts. The main footwall drifts are large enough to also accommodate vent ducting and fans to provide auxiliary ventilation to the crosscuts.

4.0 Ventilation

Refer to Appendix A for the full ventilation schematic of Kidd Mine.

Mine ventilation at Kidd Mine is predominantly an exhaust type system where primary airflow is enabled via the two 3500 Hp surface exhaust fans each operating around 465 m³/s, situated at the northern end of the mine above a dedicated exhaust vent shaft. The lower part of the mine is supported by two 4000 Hp booster exhaust fans, each operating at around 360 m3/s located on the 6000 L to overcome the high static pressure created due to the extreme depth.



Figure 3 - North Ventilation Shaft fans located to the north of the Paste Backfill Plant.

Fresh air is drawn down through #2 and #1 Shaft, the Portal and the Open Pit. #1 Shaft is the main fresh air supply for the Mine, and the intake air is refrigerated in the summer months. The Portal provides fresh air for the upper mine in the summer and is converted to an upcast exhaust during the winter months to prevent freezing of pipes and ice build up in the ramp. Fresh air drawn through the bottom of the Open Pit is passed through a "Cold Stope" containing hundreds of thousands of tonnes of rubble and waste fill which was allowed to accumulate in the secondary pillar panels above the 1600 Level, which is cooled over the winter months, freezing any groundwater or meltwater that comes into contact with the rock, which then acts as a natural coolant for the air going to the lower mine over the summer.

The general design for ventilation on production levels is an access to fresh air raise on one end of the footwall drive with another access to the exhaust raise on the opposite end of the drive. This allows for flowthrough ventilation along the entire length of the level and auxiliary fans from 50hp to 100hp are used for crosscut ventilation.

Kidd Mine utilizes a ventilation on demand system (VOD) which is comprised of digital sensors, remote operated louvers on the exhaust raise at every level, and an HMI system that provides real time monitoring and the ability to direct flow changes and start and stop auxiliary fans from the

Central Control room on surface. The system also adjusts the total level ventilation required based on equipment allocations by front line supervisors on a shift by shift basis. Gas readings are provided in real time for both CO and SO_2 on production levels, and in the ramp and main level accesses, and methane levels are measured in the No. 2 Shaft in case the burners malfunction.

Methane has been encountered in some exploration diamond drill holes. There are currently no diamond drills in operation, and any holes still venting methane are vented to a dedicated exhaust raise.

5.0 Refuge Stations

The typical production levels have a refuge station with lunchroom and comfort station (portable latrine) located between the footwall drive and the main ramp as seen in the figure below.

Refuge stations are equipped with a stretcher, blankets, a first aid kit, bottled water, compressed air lines and fire clay. Emergency procedures are posted in the Refuge Station. A sheet to document the personnel in a refuge station in case of emergency is available in the first aid box.



Figure 4 - Example level plan of 9100L with refuge station circled in green.

6.0 Air, Water and Electricity

Process water underground at Kidd is recycled from select dewatering sumps and treated at a rate of approximately 275gpm on average. Makeup water is provided by precipitation entering through the open pit, groundwater, as well as by pipe down No. 2 Shaft from a reservoir on Surface.

Compressed air is generated on surface in a dedicated compressor plant and delivered underground at an average rate of ~9,000 m³/min at ~93psi. There are three compressors available, and normally one operates, with the other two compressors on standby.

Electricity is available on each production level for working areas and at shaft MCC stations. 600V is the standard equipment operating voltage. The site is fed by 138 kV power lines from the Provincial grid to three main substations, two located beside the No. 2 Headframe and Compressor House, servicing the underground workings and one providing power to surface infrastructure located south of the Open Pit. The transformers providing power to the underground workings are sized such than any one of the two has the capacity to power the entire underground workings, with some load shedding. Power for the surface infrastructure can be back fed from the underground transformers.

Power to underground is fed down No. 2 Shaft, and then via No 4 Shaft, or boreholes for all levels below the 4700 Level to main ESS on each level.

7.0 Fire Procedures

Refer to Appendix A for the Underground Emergency Fire Procedure KMN-17-ERP-PRO-00003.

8.0 Communications

Underground communications are provided through hardwired copper based phones particularly for emergency use in the event of power outages to all Refuge Stations, main electrical substations, and Shaft stations. The production areas (and Refuge Stations) are also serviced by VoIP phones (Voice over Internet Protocol) leaky feeder radio, but predominantly through the local Wi-Fi network. Similar Wi-Fi networks also support VOD, mobile equipment automation, geotechnical, and gas detection equipment, while hardwired systems relay data from fixed infrastructure such as hoists, conveyors, pumping stations, etc.

All site personnel who regularly work in surface or underground environments are provided with iPhones equipped with Microsoft Teams software that allows for more efficient communication and completion of equipment Pre-Start inspections and reporting using dedicated third party software. Microsoft Teams also allows the transmission of data including photographs, video, audio and planning documents from any location.

Wi-Fi is extended into working headings underground with the use of hardwired industrial access points similar to home network systems and is located at all fixed infrastructure locations such as shaft and refuge stations.

A dedicated channel is available on the leaky feeder radio system for communication with Mine Rescue and other emergency personnel. Only specific radios are provided with access to the Mine Rescue channel, and those are available in the Mine Rescue room. The Mine Rescue tablets are able to communicate via the underground WiFi network.

9.0 Fuel Storage

Fuel is transported underground from a 50,000 liter tank on Surface near the No 1 Headframe, down a pipe mounted in the No. 2 Shaft to the 4400 Level. On 4400 L the fuel line follows a dedicated Ore Haulage Ramp approximately 1.1 km to the 4800 L at No. 4 Shaft. The line runs down No. 4 Shaft to the 6400 Level where it then goes through a series of boreholes to 8700L Fuel Bay which is accessible via the main service ramp. Fuel trucks bring fuel to the 6700L Fuel Bay from the main storage tank on 8700 Level. Historic fuel bays in No. 1, 2 and 3 Mines have been decommissioned, as has the 7400 Fuel Bay due to historic seismic damage. Temporary fuel cubes may be located throughout the underground work areas based on project or production needs.

The surface refueling station for Pit equipment is located south of the Surface Crusher at the south end of the Open Pit, near the Refrigeration Plant. The main fuel storage tank on surface is located south of #1 HF supplying the underground workings via an automated batch system based on the available tank capacity on the 8700 Level.



Figure 5 - 87 Fuel Bay location.



Figure 6 - 67 Fuel Bay location.

10.0 Underground Maintenance Shops

Three underground mobile maintenance shops are currently in use on 4600L, 6800L and 7500L. The 4600 Level shop is used mainly as a storage area for reserve equipment and parts and provides parking space for service vehicles. The 6800 Level shop is used for emulsion loading equipment.

All underground shops are equipped with travelling bridge cranes of varying capacity, bulk fire extinguishers, automated fire doors, cutting and welding equipment, various tools in a dedicated tool crib, and local warehouses for consumable materials. Only the 7500 Level shop is staffed with mechanics on a regular basis. Each shop also has a local office or lunchroom facility. The lunchroom in the 4600 L shop also serves as a Refuge Station.



Figure 7 - 4600L plan showing the 46 Shop circled in green.



Figure 8 - 6800L Blasters Shop circled in green.



Figure 9 - 7500 Shop and Warehousing area circled in green.

11.0 Blasting & Explosives

Underground blasting at Kidd is carried out both on-shift on off-shift based on the type of blast. Bulk explosives are stored in two main locations underground in the mine. On-shift blasting only occurs for ore pass and fixed infrastructure hang ups while off-shift blasting takes place after night shift around 5am for stopes, development rounds and secondary blasting. On-shift blasting is carried out with non-electric detonators and packaged emulsion or ANFO and off-shift blasting uses the site's electronic central blast system and pumpable or packaged emulsions.

Main underground magazines are located on 9000L and 7700L with separate areas for detonators and powder. Smaller powder and cap storages (day use) are located at various places in the mine for easier access for ore flow system blasting such as 4600L and 6800L.

On surface, the main regional magazine complex for an international explosives supplier is located 1.6 km north of the Administration building in the north half of Lot 4 of Concession 6 in Kidd Township. Access to the magazine is through a locked gate inside the Kidd industrial site, managed by the supplier. The main magazine can store up to 120,000 kg of high explosives, and the detonator magazine can hold up to 1,000,000 caps. In case of forest fire, or a fire at the magazine, the Paste Plant and the north side of the Administration building need to be evacuated to prevent injury from a sympathetic detonation, which could blow out windows in various buildings. Refer to the Emergency Response Plan for Surface Fires affecting the Powder magazines.



Figure 10 - 7700L Powder Mag circled in green and Cap Mag circled in red.



Figure 11 - 9000L Powder Mag circled in green and Cap Mag circled in red.

12.0 Transportation

Kidd Mine has the world's longest continuous service ramp from the surface Open Pit to the very bottom of current operations at 9800L, with access to every operational Level and sub-level. The main method for moving personnel and gear underground is via #2 Shaft from surface to 4700L, and then via a 1 kilometer trolley line which connects #2 Shaft and #4 Shaft on 4700L. No 2 Shaft provides access to the 800, 1200, 1600, 2400, 2600, 2800, 3400, 3600, 3800, 4000, 4400, 4600 and 4700 Levels. Loading pockets are only in use between the 4800 and 4900 Level in No. 2 Shaft. No. 3 and Mine D are serviced by #4 Shaft with main shaft stations at 4700 (collar), 4800, 5600, 6400, 6800, 7500, 8200, 8800, and 9600 Levels. Loading pocket levels are also cage accessible on the 7700, 8300, and 9000 Levels. Ramps are provided to the bottom of both operational shafts for dewatering and maintenance. Trackless equipment is also available for transporting workers to work sites such as Toyotas or Tractors equipped with person carriers.

13.0. Personnel Working

On a given Monday to Friday Day Shift there are approximately 80-120 personnel underground at any time including production and maintenance workers, technical support and supervisors/management. There are around 40-50 personnel underground on Night Shift.

Shift schedules are staggered base on crew rotations, and cage times are varied to accommodate the movement of personnel. Production and Maintenance crews work either a 7 x 12 or 7 x 10.5 hour rotation on day and night shifts, with Staff working a 4 x 10 hr schedule either Monday to Thursday or Tuesday to Friday on dayshift only. Oreflow (Hoist operators, Cage tenders, etc.) work a 5-5-4 rotation on 12 hour shifts.

14.0 Mine Rescue Equipment

Kidd Mine maintains an emergency ready Mine Rescue substation inside the Administration Building which is accessible via a large roll up door to the Surface production area for Ambulance, and Mine Rescue Officer vehicles.

Kidd Operations currently have 48 trained active Mine Rescue personnel, comprised of a mix of Production employees, Supervisors, and Technical Staff. There are normally up to 10 active Mine Rescue personnel on site on any given production shift, and up to an additional 10 personnel from the Supervisory and Technical staff on Dayshift Monday to Friday. Kidd also participates in a mutual aid agreement with other mines within the Timmins District for the purposes of providing additional trained personnel for major extended events.

Item	Quantity
Draeger BG4	11
Spare BG4 Cylinder	6
Soda Lime Jug	12
SSR 90 M	4
Captain's Standard Equipment Set	2

The Mine Rescue substation contains the following equipment:

Mine Rescue Tablet	2
Mine Rescue Tablet Spare Battery	2
First Aid Kit	2
Kestrel 3500	2
Industrial Scientific MX6 iBrid	2
Draeger CareVent	1
Evolution 5000 Series Thermal Imaging Camera	1
Backboard and Basket	2
Blanket	3
Responder Bag	2
Reciprocating Saw	1
Lifting Bag System	1
PRO/pak	1
CAF System	1
Fire Hose	4
Fire Nozzle	2
KED	1

The No 2 Shaft Hoistroom is located at the top of the Headframe, and the Hoist operator has access to a SCBA and jumbo cylinder which is immediately available in the Hoistroom. The No. 4 shaft hoist operator is located in the Administration building and the hoists are run remotely. If necessary, the No. 4 Shaft Main and Auxiliary hoists can be operated locally from the Hoistroom on the 4400 Level, and a SCBA and jumbo cylinder would need to be taken down from surface.

Both the No. 2 Shaft and No. 4 Shaft Cage Tenders are equipped with SCBA and jumbo cylinders for use in an emergency. The SCBA and jumbo cylinders are stored in the Collar House on Surface in No. 2 Shaft and at the 4700 No. 4 Shaft Collar underground. In the event of an emergency, the Cage Tenders are instructed to travel to the respective collar and don their breathing apparatus and man the conveyances for use as required by emergency response personnel.

15.0 Seismicity

The Kidd Operations have a history of large seismic events going back as far as 1986, beginning in No. 1 Mine. Strain burst events are rare but do occur, however the most significant seismic events are associated with fault slip, triggered by the excavation of large volumes of rock or ore. The largest events on site occurred in upper Mine D in 2009 and 2011, when there were Mn 3.8 rockbursts triggered by the generation of mining induced shear planes developed between stopes being mined concurrently in the Main and satellite Greywacke ore zone.

There is a comprehensive seismic management plan, and a state of the art seismic monitoring system which covers the orebody from the 6000 Level to below the 9800 Level. A strong ground motion system provides information on large events which could saturate the microseismic system, comprised of sensors on the 1200, 2400, 4700, 5600 and 6000 Levels, and a remote sensor at Feldman Lake, 6 km southeast of the mine on Surface.

Data from the seismic system is sent through a dedicated fiber optic network to a server on surface. Data is displayed from the seismic system in near real time in CPCR (Central Process Control Room). All events are manually reprocessed, and the final data is stored in a separate database. The Ground Control department monitors the system on Monday to Friday dayshift while CPCR monitors the system on Night Shift and weekends. Members of the Ground Control Department can also access the system remotely 24/7 from home via a VPN connection. Several members of the Ground Control department are also trained in and active Mine Rescue members and would be assigned to the first team responding to a major seismic event if necessary.

Access to potentially seismically active areas is controlled through a Seismic Barricade and reentry process, and permits are required to enter any seismically active areas. Automated scoop trams controlled from Surface are used to remove ore from stopes in seismically active areas after production blasts to minimize the exposure of personnel. The VOD system allows gas monitoring to be done remotely after long hole blasts, again reducing the exposure of personnel to post blast seismicity. The current seismic restrictions and post blast seismic restrictions are posted twice daily in the TEAMS Seismic Channel. Areas under active seismic restrictions are isolated by dedicated unique barricades, comprised of a chain and red sign clearly stating "Seismic Barricade – Entry Permit Required". The ground support systems are designed to withstand a Mn 3.0 event at a distance of 50 m with minimal damage.



Figure 12 – Kidd Mine Seismic Visualizer output showing overall mine view in 3D, select levels, sensors, and seismic data. Blasts are identified by 'stars' while events are shown by spheres. Colour and symbol size show magnitude.

When In Use

Location Signs permanently mounted above the eyebolt on each wall at all designated locations. In this example "A" = Level Access "RG" = Robo Gate



Barricade to be hung along the wall with printed side of sign facing the rock surface once restriction is lifted

Figure 13 – Typical Seismic Barricade at entrance to a restricted zone

16.0 Appendix A

Underground Emergency Fire Procedure - KMN-17-ERP-PRO-00003