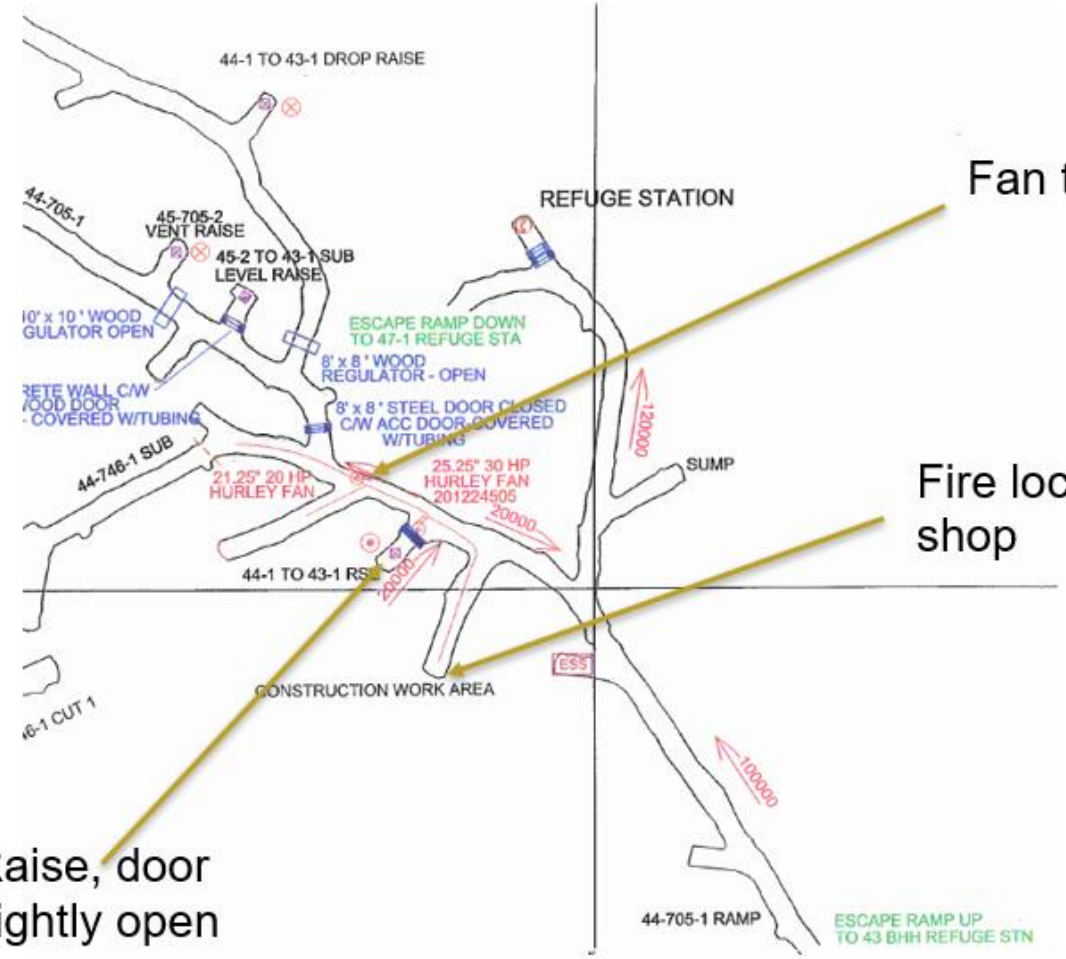
UG Fire Construction Storage 44 Level

Red Lake Gold Mines
April 2019

What Happened?

- At approximately 18:30 hrs. on December 6, 2018, three workers were on route to the 4400-level construction storage/work area to gather their work gear. When the workers arrived at 4400-level, they smelled smoke.
- Two workers proceeded towards the back of the construction storage area, both with a 10lb fire extinguisher in hand to further investigate.
- The third worker was instructed to proceed to the 4500-level refuge station and contact Security to instruct them to stench the mine. The worker remained in the refuge station, awaiting further instructions.
- As the two workers approached the back of the storage bay, they noticed a large flame. The workers attempted to extinguish the fire with no success. With increasing smoke in the area, the workers left the area to seek refuge.
- All mine complexes were stenched, and Mine Rescue was deployed.

Level Plan?



Fan to shop turned off

Fire location back of shop

Vent Raise, door was slightly open

Fire Action Plan

- On December 6, 2018 at 19:18 hrs, Security received a report of fire underground in the 44-storage area. All emergency procedures were instantly implemented (stench dropped).
- Mine Rescue Team 1 was deployed at 21:05 hrs, as a fire fighting team.
- They turned off the power to the 44-1 storage area from the 44 ESS.
- The proceeded to fight the fire with 2x 10lb A,B,C multipurpose fire extinguishers, then retreated to the collar to assess with the thermal imaging camera (tic).
- Team 1 then proceeded back inside the shop area to deploy 2 more 10lb A,B,C multipurpose fire extinguishers on the hot spots that were identified with the tic.

Fire action Plan Continue

- Team 1 opened the air regulator door down-wind to ventilate into the R.A.R.
- Team 1 headed to surface, and ran out of oxygen at 23:43 hrs.
- Team 2 went underground at 00:05 hrs.
- Team 2 went under oxygen at the ESS.
- Team 2 cooled down the area with a fire hose and nozzle, and confirmed that the fire was out at 02:10 hrs.
- Team 2 left the fire hose and nozzle on the “fog” setting.
- Team 2 then headed to surface. Stand down was called at 03:00 hrs, and the investigation team began their investigation.

Call to Action

- Fire investigation conducted by a third party.
- Assess integrity of steel damaged (i.e., overhead crane, ground support, etc.).
- Develop a program and research opportunities for better storage, handling, and charging of the lithium batteries.

Over view of findings

Investigation:

Third party investigators from the firm *Origin and Cause*, alongside the Red Lake Safety Team, completed an extensive investigation into this fire and determined the origin and cause of this fire.

Overview Summary of Investigation Findings

During dayshift on December 6, 2018, the storage/work area on 44-1 level was occupied by one worker who was constructing a steel pastefill insert. Throughout the shift, multiple workers entered the work area to pick up materials and tools (some were cordless). At the end of the shift, the crews returned the tools to storage and placed two lithium batteries on charge on a charging station located in the storage area.

Overview Summary of Investigation Findings (Cont'd)

The charging location (shown below) was a wall-mounted steel frame with wooden shelves, on the left wall of the storage area. On the top shelf were 4 battery chargers (two 18-volt chargers on right, and two 28-volt battery chargers on left). The units were plugged into 2 power bars, which received power from a wall-mounted receptacle. The second shelf was use for lithium battery storage.

Origin Fire

ORIGIN

The fire originated in construction materials storage area 44-1 (Construction storage/work area). The area of origin was at the left rear of the drift, behind a locked steel door, parted by a 10-foot steel wall. The area had been unoccupied for in excess of an hour. The point of origin was a steel frame, wall-mounted assembly with 2 wooden shelves. The shelf contained several lithium-ion batteries and chargers. Some chargers were in use, and many batteries (both charged and uncharged) were piled on the shelf.

The charring of table faced the area of origin

The steel shelf assembly hanging at area of origin

Cause

CAUSE

The cause of the fire was accidental, and was related to the battery-charging operation, chargers, power bar to lithium-ion battery, and battery storage method:

- **Charger:** Exposure to water, humidity, dust, and petroleum products, as well as manufacture defects, all increased the risk of fire hazard.
- **Power bar:** Not designed for charging application.
- **Batteries:** Subject to damage due to dropping from heights, contacts on batteries may have been exposed to dirt or petroleum products, or possible over-charging of the batteries, or extended life use.

Remains of lithium battery cells

Corrective Actions Plan and Recommendations

- Examine the design and purchase approved cabinets for storage and charging of cordless lithium batteries.
- Source supplier for purchase of arc fault breakers and install at determined cordless lithium-ion battery group charging locations.
- Develop a cordless tool management procedure for site, and include the following safety factors:
  - purchase
  - use
  - charging and charging locations
  - battery storage
  - battery disposal
- Site-wide audit on cordless battery management.

Lessons Learned

Past practices do not reflect safety management processes that are currently in place, such as Formal Risk Assessments, Team-Based Field Level Risk Assessments, or Management of Change. Our current processes may have identified potential hazards that could have prevented potential causes to the incident.