Vale's Copper Cliff Nickel Refinery converts metallic feed streams (primary nickel oxide and nickel sulphide) from the Smelter Complex and Clydach Nickel Refinery in the United Kingdom into pure nickel pellets and powders that are 99.99% pure and sold to market. Cobalt, copper and platinum group metals (PGMs) associated with feed streams are further refined at Vale's Electrowinning Plant and Port Colborne Refinery.

Below is how material flows through the facility. The refining process includes some hazardous materials, which are highlighted in red through the flowsheet. See page 2 for hazardous material risk mitigation measures.
Hazardous Materials and Risk Reduction Measures

Nickel carbonyl (tetracarbonyl):
- Risk mitigation measures include the use of Self-Contained Breathing Apparatus (SCBA) when conducting maintenance and operating tasks.
- Area monitors analyze the air at the facility and at the perimeter to determine potential combined carbonyl release to the environment.
- Urinalysis is conducted with suspected nickel carbonyl exposure and if high levels are confirmed, they are treated with chelating agents.

Iron carbonyl (pentacarbonyl):
- Risk mitigation measures include the use of Self-Contained Breathing Apparatus (SCBA) when conducting maintenance and operating tasks.
- Area monitors analyze the air at the facility and at the perimeter to determine potential combined carbonyl release to the environment.
- Nickel urinalysis is conducted with suspected iron carbonyl exposure (as iron carbonyl is never present in the absence of nickel carbonyl) and treatment is determined by Vale's Occupational Medicine department, if required.

Carbon monoxide (CO):
- Risk mitigation measures include the use of personal CO monitors by personnel in the Inco Pressure Carbonyl (IPC) plant that sound an alarm at a level of 25 ppm.
- CO point guards are present in the plant to test for CO.
- Protocols are in place to test for oxygen levels and administer oxygen, if required, by trained personnel if exposure to CO is suspected.
- If it is suspected that fumes are still present in the plant, the emergency response teams wear CBA.

Anhydrous ammonia:
- Deliveries of anhydrous ammonia are coordinated and protocols are in place to ensure safe delivery and unloading.
- Respiratory Personal Protective Equipment (PPE) is required when expected exposure levels are greater than 25 ppm, up to and including the use of SCBA.
- Skin and eye PPE are also required when handling anhydrous ammonia.

Nickel oxide:
- Risk mitigation measures include the use of appropriate PPE when handling nickel oxide, including gloves, safety glasses and a dust respirator.
- Occupational Health Monitoring is conducted (personal and area).
- Multiple baghouses are used to collect dust from conveyance and storage systems.