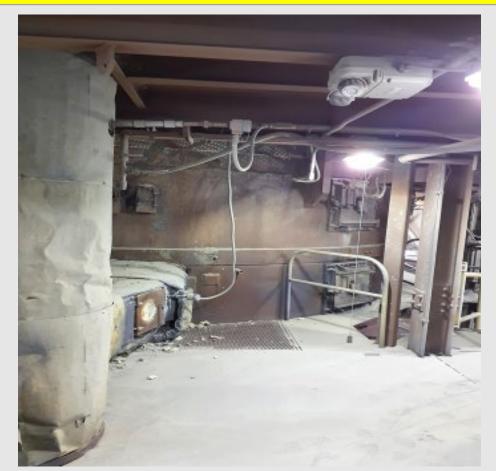




Preliminary Incident Details		
Operation	Sierrita	
Date / Time	April 4, 2023 / 11:00 a.m.	
Туре	Near Miss	
Summary	Two electricians were exposed to SO2 gas after entering the hearth of roaster to do work on a thermocouple while the scrubber was being cleaned. One electrician was wearing a Powered Air Purifying Respirator with the hood up, while the other was not wearing any respiratory protection. They reported the incident and were evaluated in the clinic the next day.	
Fatal Risk	Exposure to Hazardous Substances – Acute	
Risk Category	Actionable	
Pre / Post Rating	Significant (3) Likely (3)	
Findings / Missing Controls	 Access Control Personal Monitors Respiratory Protection Response to Alarms 	
Applicable Policies / Procedures	Hazardous Gas Policy	
Employee Condition	No injury	
Contact	Cara Forbregd, Manager-Health and Safety	

Photos / Links



The building electricians entered and were exposed to sulfur dioxide gas.



Potential Fatal Event Learnings: Sulfur Dioxide Exposure in Roaster



Causal Factors	Fatal Risk Management Controls	
 The employees were unaware of newly implemented PPE requirements incident a few weeks prior (PFE #2023-7). 	 Atmospheric Monitoring – INSUFFICIENT Is personal air monitoring equipment in use, functioning properly, and within the designated breathing zone, where required? Emergency Response – INSUFFICIENT Do I understand the evacuation procedures if an alarm (both 	
Action Items (All actions in progress but incomplete following PFE #2023-7)	Hierarchy of Controls	 personal and/or stationary) is triggered? Can I recognize an upset condition that may warrant evacuation in alarms are present?
Install interlocks in conjunction with automation	Engineering	 Engineering Controls – INSUFFICIENT Are proper process controls (pH, temperature, cell voltage, ventilation, etc.) systems (including backups) functioning properly to prevent unintended release of hazardous substances? PPE – INSUFFICIENT Is proper PPE for the task/area being used or quickly available (e.g., escape respirators)? Storage and Distribution – SUFFICIENT Handling Requirements – SUFFICIENT Work Practices – SUFFICIENT Barriers and Segregation – SUFFICIENT
Create and implement emergency drills for evacuation situations from roaster building	Administrative	
Implement and communicate new PPE requirements for roaster building (e.g., Tango gas monitor and escape respirator)	Administrative	
Add Powered Air Purifying Respirator requirement and communicate to all crews	Administrative	
Add alarm to SO2 monitoring system in roaster building	Engineering	

Failed Safeguards / Additional Learnings

- Install emergency back-up generator for roaster and off-gas system
- Improve sampling plan for roaster area to include area and personal sampling for SO2 (during regular operation and when cleaning/switching scrubbers)
- Evaluate the use of tablets/tools so employees can access SOPs from the field to be able to verify information given to them by the control room operator
- Install signage with SO2 information inside the roaster building
- Review alternative technology to reduce scrubber cleaning
- Identify other areas of exposure and generate appropriate controls