Air Quality Advisory Committee

February 8, 2023

Agenda

1. Welcome/Introductions
2. Recap of Previous Meeting
3. Community Opens
4. AQAC Opens
5. Good Neighbor Agreement Items Update
6. Agenda for Next Meeting
7. Public Comments/Questions

GNA-Specified Agenda Items

- Intel to report to the AQAC at its quarterly meetings on:
  - Stack testing completed since the last AQAC meeting; any stack testing planned before next AQAC meeting
  - Annual or semiannual reports submitted by Intel to DEQ pursuant to Intel's air permit
  - Any requests to DEQ for authority to modify emission factors or emission sources that were submitted since the last AQAC meeting or that Intel anticipates will be submitted prior to the next AQAC meeting
  - Any excess emissions and upsets reported to the Department during the most recent calendar quarter

    *Implemented measures identified on Attachment A

Stack Testing Overview

- Why does Intel perform stack testing?
  - Determination of compliance with Best Available Control Technology (BACT) emission limits
  - Determination of Rotary Concentrator Thermal Oxidizer (RCTO) control efficiencies
  - Development of emission calculations for fluorides and hydrogen fluoride
  - Good Neighbor Agreement Attachment B requirements
- Stack testing plans are reviewed and approved by Oregon DEQ and utilizes standard EPA and/or DEQ test methods
- Stack testing performed by a 3rd party stack testing firm

Stack Testing Update

- Activities since Q4 meeting (11/9/22)
  - Two reports submitted to ODEQ for scrubber and RCTO compliance stack testing programs
- Planned Q1 2023
  - No planned stack testing currently anticipated

Continuous Emissions Monitoring System Overview

- Rotor Concentrator Thermal Oxidizer (RCTO)
  - Used to control emissions of VOCs
  - Method of control: Thermal oxidation (combustion)
    - Temperature = Key operating parameter
    - Measurement via thermocouple
    - Minimum temperature established during stack testing
    - Temperature measurements are reviewed on an ongoing basis
    - Alarms are also set to alert when measured value outside the acceptable range
      - Alarms are indication of off-spec operation, not an indication of excess emissions or bypass

Continuous Emissions Monitoring System Overview

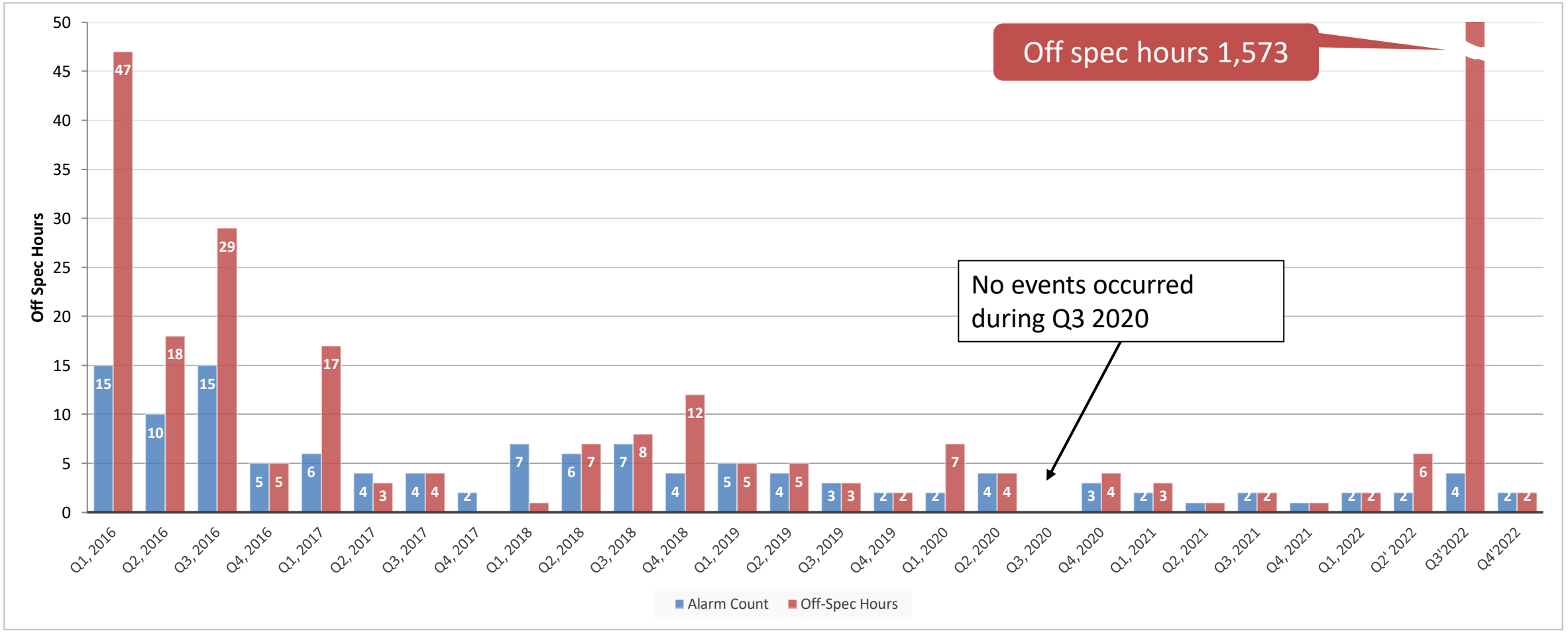
- Wet Scrubbers
  - Used to control emissions of acid gases, primarily Fluorides, HF, and HCl
  - Method of control: pH adjusted water absorption
    - Water flow rate and pH = Key operating parameters
    - Measurements via pH probe and flow meter
    - Minimum pH and flow established during stack testing
    - Measurements are reviewed on an ongoing basis
    - Alarms are also set to alert when measured value outside the acceptable range
      - Alarms are indication of off-spec operation, not an indication of excess emissions or bypass

Continuous Emissions Monitoring Report – Q4 2022

Attachment C

Source	Frequency	Parameter	Monitoring Equipment	Q4, 2022 Report
Rotary Concentrator Thermal Oxidizers (RCTO)	Continuous	Temperature	Thermocouple	No events
Acid Gas Scrubbers	Continuous	Flow pH	Flow Meter pH probe	No events 2 events
Emergency Generators/Fire Pumps	When used	Hours of operation including time of engine start, time of engine stop and reason for operating		No events

Continuous Emissions Monitoring Report



- Normal hourly operations for Q4 2022 is > 99.99%
  - Off-spec operation is not an indication of excess emissions and was limited to 0.01% of the hours for Q4 2022
- Blue bars indicate the number of alarms per quarter
- Red bars indicate the number of hours outside of normal operation per quarter

pH Event Details

- Background
  - Our scrubbers work by passing a gas through a liquid that absorbs the pollutant
  - Because the gas is acidic, we keep the liquid neutral to optimize absorption
    - We continuously monitor pH to ensure working optimally
  - September 9, 2022: We discovered that the pH monitoring on one scrubber at D1XM2 had been inadvertently turned off since July 7, 2022 when it was last maintained
  - The scrubber was working but was not controlling emissions at its normal efficiency during this time.
  - The pH transmitter was returned to the correct operating state immediately and the scrubber returned to a normal operating condition.
  - Intel immediately started an investigation
  - Based on the investigation, we submitted a deviation report to the ODEQ on 9/23/22
  - January 17, 2023: We received notice that ODEQ was commencing enforcement

pH Event Additional Information Cont.

- AQAC asked that we provide assessment of risk presented by scrubber malfunction
- In late 2015 AQAC/Dr. Sahu reviewed Health Risk Assessment (HRA)
  - Assessed Intel's impact at full buildout using California risk assessment methodology
  - Maximum Acute Residential Impact: 0.46
  - Threshold Level: 3.0
- Assessment of 2022 Scrubber event
  - Calculated Maximum Acute Residential Impact if we assume scrubber offered zero control
    - Used DEQ screening methodology from Cleaner Air Oregon (aka, Level 1)
    - Maximum Acute Residential Impact: 0.045 due to scrubber malfunction
  - Added scrubber-specific impact (0.05) to the facility-wide impact (0.46)
  - Maximum Acute Residential Impact: 0.51
  - Total impact < 3

  Conclusion: Acute impact from scrubber event was well below the HRA Threshold Level of 3.

Corrective Actions

- ✓ Notified management
- ✓ Engineering controls and programming changes implemented
- ✓ pH transmitter procedures updated
- ✓ Reevaluated trend review protocol
  - ✓ Implemented changes to improve visibility/detection
- ✓ In depth review of the event with operations personnel
  - ✓ Reviewed permit conditions
  - ✓ Shared revised training procedures
  - ✓ Conducted training
- ✓ Shared event summary and lessons learned with managers and leadership teams globally

DEQ Submittals since November AQAC Meeting

- 2022 RCTO Stack Test Report submitted 11/28/22
- 2022 EXSC Stack Test Report submitted 1/6/23
- D1XM2 RCTO Bypass Notification submitted 12/27/22

- Updated Emission Factors
  - Equipment EF Request submitted 2/6/23
  - Plan to submit Process EF Request in early February

D1XM2 RCTO Bypass on 12/16/22

- The D1XM2 EXVO 2 system experienced two related RCTO bypass events
  - Combined bypass time: 342 minutes
- Event 1:
  - RCTO #3 was scheduled for maintenance, however the operator mistakenly isolated RCTO #2 (which was running) causing the unit to shut down resulting in a bypass event.
  - Operators verified the load capacity and closed the bypass damper ending first event.
- Event 2:
  - RCTO #4 shut down due to increased flow to unit causing a high temperature fault.
  - RCTO #2 and #3 were still in process of coming online and reaching operating temperatures. This led to the bypass damper reopening resulting in the second bypass event
  - Once RCTO #2 was ready, process gases were routed to the unit ending the bypass.

RCTO Event Impact & Corrective Actions

- Assessment of RCTO Bypass event
  - Calculated Maximum Acute Residential Impact based on the additional emissions
    - Used DEQ screening methodology from Cleaner Air Oregon (aka, Level 1)
    - Maximum Acute Residential Impact: 0.01 due to bypass
  - Added bypass impact (0.01) to the facility-wide impact (0.46)
  - Maximum Acute Residential Impact: 0.47
  - Total impact < 3

  Conclusion: Acute impact from RCTO bypass event was well below the HRA Threshold Level of 3.

- Corrective Actions
  - ✓ Isolation procedures updated to address root cause
  - ✓ Component labeling upgraded
  - ✓ Local staff received training to increase awareness and prevent recurrence
  - ✓ Shared event summary and lessons learned with managers and leadership teams globally

Planned Q1 2023 DEQ Submittals

- Annual/Quarterly submittals
  - Q4 NOx and CO emission factor update
    - Process, RCTO and EXSC emission factor update
  - RY2022 Annual Compliance Report

Agenda for Q2 AQAC Meeting 2023

May 10th 2023

AQAC members to have input into the next agenda for each AQAC meeting

- Standing agenda items
  - DEQ Submittals
  - Stack Testing Update
  - Project Update
- Other?

Public Comments/Questions

BACKUP

Attachment A

Emission Reduction Project	Target Date	Status / Method of Confirmation
Advocate to contractors working at the Facility to use newer onroad and nonroad diesel engines	2nd quarter 2016	Ongoing collaboration with suppliers to encourage reductions
Evaluate ways to reduce (if possible) diesel particulate matter emissions either with onsite or offsite projects	3rd quarter 2016	Reported out during Q3, 2016 AQAC quarterly meeting
Decommission four Fab 5 boilers	3rd quarter 2016	Completed
Assess feasibility of reducing waste tank emissions	4th quarter 2016	Completed
Retrofit RCTOs to optimize natural gas usage	2nd quarter 2017	Completed
Boiler replacement with ultra low-NOx burner boilers at RA2 and RP1	3rd quarter 2017	Project completed. Report out during Q3, 2017 AQAC meeting
Compare actual emissions inventory in 2020 to inventory used in HRA	2nd quarter 2021	Completed. Reported to AQAC at quarterly meeting