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NCASI Technical Program Update Series

Air Quality

AUGUST 20, 2024

Agenda

- Regulatory Update
- EJScreen
- NCASI Member Support Case Studies
- NCASI Annual Meeting

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Air Quality Regulatory Update

EPA Pulp and Paper ICR Timeline
As of August 19, 2024

- August 2024 - Final Draft ICR to Stakeholders

- ICR Letters to Facilities – October 2024
- Equipment Survey
  - 4-5 months to complete
- Late Spring/Early Summer 2025 – EPA list of Subpart MM testing requirements to facilities
  - 9-12 months to complete Subpart MM Testing
- Fall/Winter 2025 – EPA list of Subpart S testing requirements to facilities
  - 12+ months to complete Subpart S Testing

Best Guess Timeline:

- October 2024 – Letters to Companies
- Feb/March 2024 – Equipment Survey Back to EPA
- May/June 2024 – Supplemental to facilities with which Subpart MM units to test for what
- September 2024 – Supplemental to facilities with which Subpart S units to test for what
- Feb-June 2025 – Subpart MM Testing to EPA
- Jan 2026 -- Subpart S Testing to EPA

Boiler MACT
Template for "Consolidated Semiannual Compliance Report"

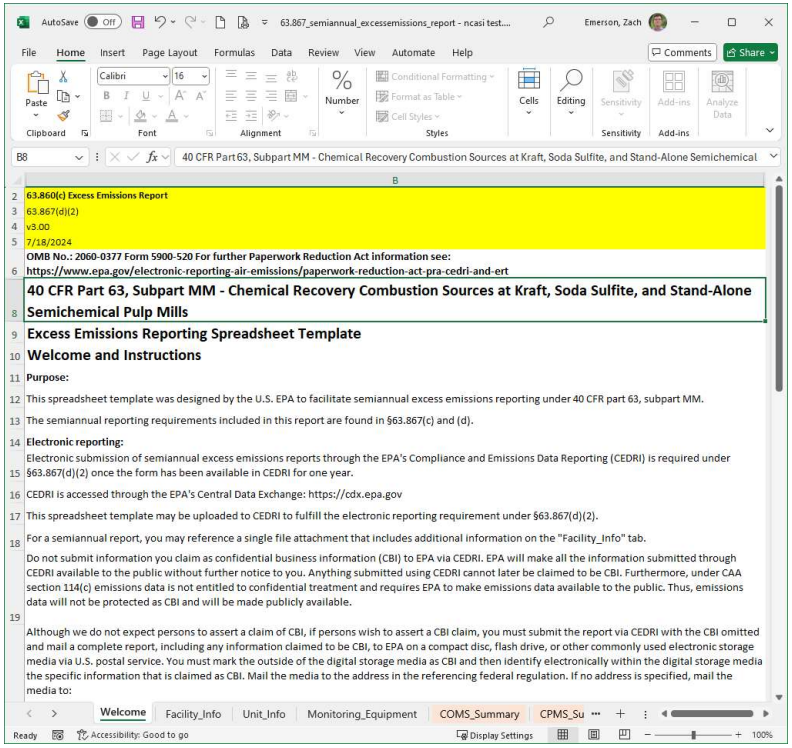
- Added 5/15/24, Updated 6/27/24

- Consolidates 5 other Excel Reports (Replaces the XML Schema or Direct CEDRI Entry?)
  - CMS
  - CEMS
  - Fuel Use
  - Deviation
  - Malfunctions

- Tabs
  - CMS
  - Performance Test
  - Fuel Analysis
  - Statements
  - Malfunctions
  - Tune Up
  - Rolling Averages
  - Deviations – No CMS
  - Deviations – w CMS
  - Deviations Summary
  - CMS Downtime
  - CMS Summary
  - Changes
  - Startup/Shutdown
  - S/SD Averages

Subpart MM – Pulp and Paper Chemical Recovery Template for Excess Emissions Reporting

- Released 4/2/24, Updated 7/18/24
- First required use for the 1st 2025 Semi-annual



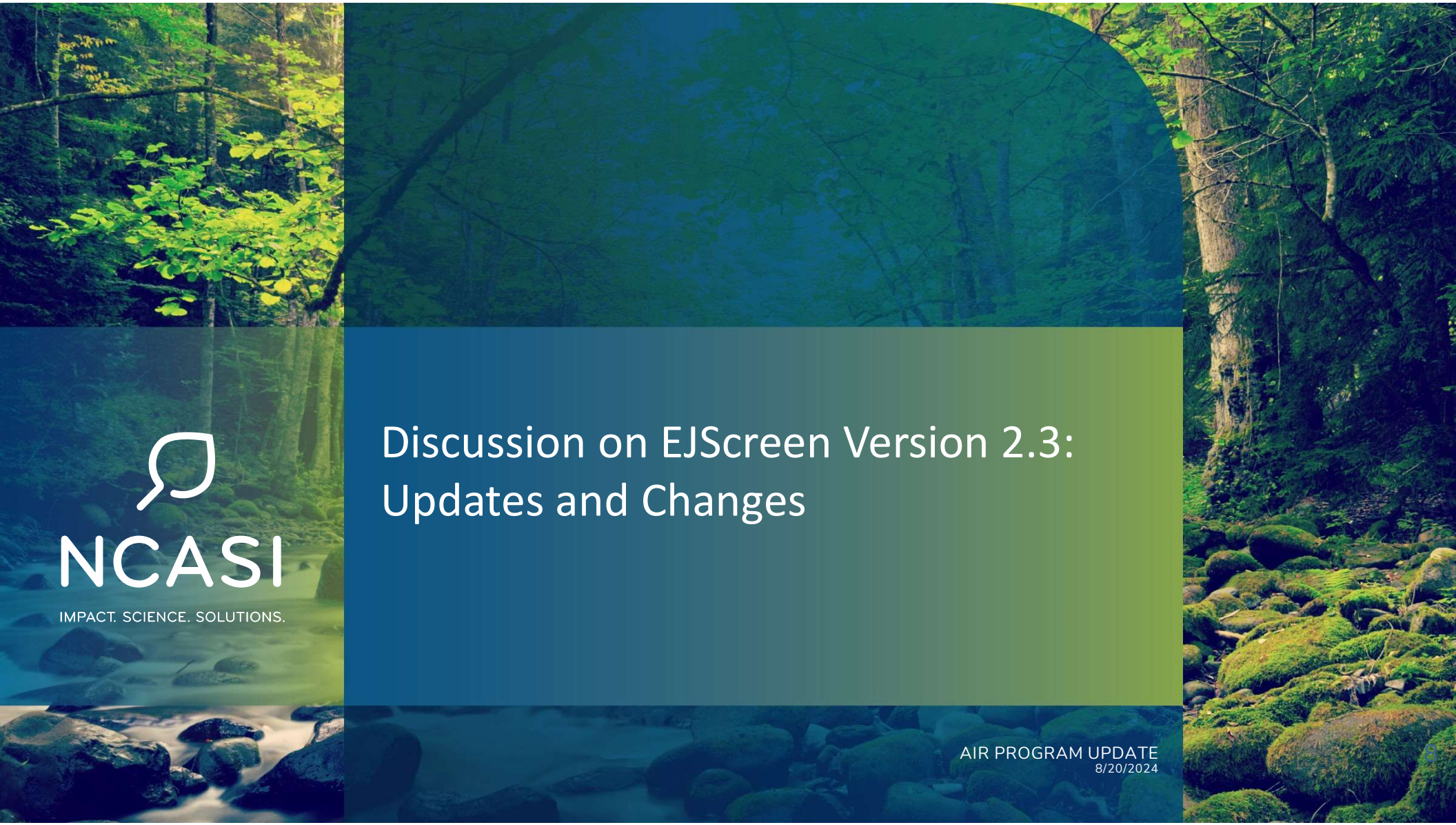
Recent Publications

- CC Memos
  - CC-24-003 – OTM-50 for PFAS Stack Testing
  - CC-24-007 – Worst Case Discharge Rule
- Briefing Notes
  - BN-24-01 – EJScreen Insights
- Whitepapers
  - WP-24-02 – Does TDF Burning in Coal & Combination Bark/Coal Boilers Reduce Mercury Emissions
  - WP-24-06 – Adjustment Protocol for CPM Measurements via Method 202

- Journal Publication

  Evaluation of Fine Particulate Matter (PM2.5) Concentrations Measured by Collocated Federal Reference Method and Federal Equivalent Method Monitors in the U.S.

  Khan, T.R., Emerson, Z.I., Mentz K.H.
  Atmosphere 2024, 15(8), 978



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Discussion on EJScreen Version 2.3: Updates and Changes

AIR PROGRAM UPDATE
8/20/2024

CHANGES & UPDATES

- EPA released EJScreen Version 2.3 on July 9, 2024.
- Environmental indicators are renamed as "**environmental burden indicators**".
- The new version includes two additional indicators:
  - **Nitrogen dioxide (NO_2)**: utilizes NASA satellite data to display average annual NO_2 levels.
  - **Drinking water non-compliance**: uses modeled drinking water system boundaries to overlay Safe Drinking Water Act violations of water systems.
- Two indicators related to air toxic data sets—**air toxic cancer risk** and **air toxics respiratory hazard index**—have been moved from environmental indicators.
- The total number of environmental burden indicators in EJScreen V2.3 remains at 13.
- Data year updates: $PM_{2.5}$, ozone, NO_2, diesel PM, superfund proximity, RMP facility proximity, hazardous waste proximity, underground storage tanks, wastewater discharge.

CHANGES & UPDATES (CONT'D.)

- Several new map layers added:
  - ❑ **Extreme Heat Data**: Shows average days above 90°F (2019–2023) per census block group, using dry-bulb temperature.
  - ❑ **Private Drinking Wells**: Maps well distribution and density (2020); about 20% of U.S. relies on private, unregulated wells.
  - ❑ **Drinking Water Boundaries**: Outlines 44,000+ community water system service areas, serving 99% of public water customers.
  - ❑ **Air Toxics Cancer Risk**: Estimates lifetime inhalation cancer risk from air toxics, reported at the census block level.
  - ❑ **EJ Grants**: Maps various EPA-funded EJ programs, including Small Grants, Problem-Solving Agreements, and Technical Assistance.
- V2.3 includes version number and date/time of run (added after a request made by NCASI)

METHOD CHANGES

The **demographic index** and **supplemental demographic index** calculations were changed to using z-scores (previous version used % values).

The updated formulas for these two indexes are:

$$Demographic\ Index = \frac{\%LowIncome_z + \%PeopleofColor_z}{2}$$

$$Supplemenal\ Demographic\ Index = \frac{\%LowIncome_z + \%LimitedEnglish_z + \%LessthanHS_z + \%Disabilities_z + \%LowLifeExp_z}{5}$$

Note that in the calculation of the supplemental demographic index, percent unemployment used in EJScreen Version 2.2 has been replaced by percent disability in Version 2.3.

METHOD CHANGES (CONT'D.)

A z-score is a statistical measure that indicates how far a specific value is from the mean of a data set. Negative z-scores represent values below the mean, while positive z-scores indicate values above the mean.

Using μ for the mean and σ for the standard deviation, a Z-score value can be calculated as follows:

$$z = (x - \mu) / \sigma$$

For example, given a particular block group with percent low income value (x) of 45%, a mean value (μ) of 30.4% and the standard deviation (σ) of 21.3%, the Z-score value for percent low income can be calculated as follows:

$$z = \frac{45 - 30.4}{21.3} = 0.685$$

METHOD CHANGES (CONT'D.)

EJ Index Example:

For a block group (ID = 410510068022) in Lincoln County, OR, the percent of people of color is 0.252511 while the national mean is 0.395843 and the national standard deviation is 0.315152. The percent low income is 0.1873 while the corresponding national average is 0.30415 and the national standard deviation is 0.213371. All values here are in decimal. Based on the Z-score formula introduced previously, a Z-score value for the percent people of color or percent low income can be computed as follows:

Converting the data into tabular form

Parameter	Value
% People of Color	0.252511
National Mean (x)	0.395843
National Std Dev (μ)	0.315152

Parameter	Value
% Low Income	0.1873
National Mean (x)	0.30415
National Std Dev (μ)	0.213371

The equation for EJ Index calculations is as follows:

$$EJ\ Index = Demographic\ Index \times Normalized\ Environmental\ Indicator$$

METHOD CHANGES (CONT'D.)

$$\%\ people\ of\ color_z = \frac{0.252511 - 0.395843}{0.315152} = -0.454803$$

and

$$\%\ low\ income_z = \frac{0.252511 - 0.395843}{0.315152} = -0.547638$$

So the demographic index is:

$$Demographic\ Index = \frac{\%\ People\ of\ Color_z + \%\ LowIncome_z}{2} = \frac{-0.454803 + (-0.547638)}{2} = -0.501221$$

Therefore, the EJ Index for Superfund Proximity is a product of the demographic index and the national percentile for Superfund Proximity. For this block group, the national percentile for Superfund Proximity is 59. So the EJ Index is:

$$EJ\ Index = 59 \times (-0.50121) = -29.572039$$

EJ Index VALUE not PERCENTILE

After comparing the EJ Index lookup table for the Superfund Proximity using the EJ Index value above, the national EJ Index for Superfund Proximity for this block group is 15.

EJ Index PERCENTILE

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COMPARING EJSCREEN RESULTS BETWEEN VERSIONS 2.2 AND 2.3

Tracking Site 1

Indicator	V 2.2	V 2.3	V 2.2	V 2.3
	EJ Index (State Percentile)	EJ Index (State Percentile)	Value	Value
PM2.5	21	16	6.64	9.42
Ozone	43	19	51.6	30.4
Diesel PM	54	49	0.212	0.144
Toxic Releases to Air	57	52	520	520
Superfund Proximity	61	0	0.04	0
RMP Facility Proximity	70	62	0.22	0.5
Hazardous Waste Proximity	45	48	0.15	0.5
UG Storage Tanks	67	63	2.7	2.2
Wastewater Discharge	25	42	0.000015	2.2

Tracking Site 2

Indicator	V 2.2	V 2.3	V 2.2	V 2.3
	EJ Index (State Percentile)	EJ Index (State Percentile)	Value	Value
PM2.5	36	20	9.54	8.46
Ozone	41	13	62	52.2
Diesel PM	60	77	0.296	0.229
Toxic Releases to Air	72	72	1200	1200
Superfund Proximity	62	0	0.036	0
RMP Facility Proximity	94	86	1.4	1.2
Hazardous Waste Proximity	70	62	0.35	0.74
UG Storage Tanks	85	85	5.2	5
Wastewater Discharge	82	85	0.0065	640

Questions/Comments?

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NCASI Member Support Case Studies

NCASI Member Support – Case Studies

Regulatory & Permitting

Stack Test Planning and Review

Emission Estimates

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NCASI Member Support – Case Studies

Regulatory & Permitting

Title V Permit Review

- **What:** Facilities want to know what is a typical permit condition for a given operation or scenario.
- **Why:** Facilities want reasonable requirements and to avoid wasted work. The industry wants to avoid uncertainty in the implementation of regulations.
- **Role of NCASI Research:** NCASI has tracked regulations and provided member support for many facilities. NCASI keeps a database of access to Title V permits for most states.
  - NCASI can help
    - Avoid onerous requirements
    - Identify better approaches used elsewhere
    - Serve as the industry's memory for similar questions
    - Serve as point of contact between companies

Title V Permit Review - Example

- **What:** Facility asked NCASI to review an unusual addition to their draft Title V permit. The requirement was related to an obscure line item in the state exemptions for an insignificant process unit.

- **How:**
  - NCASI reviewed 10 other pulp mill permits in the state and didn't find similar language even in very recent permits. (and state regs)
  - NCASI reviewed about a dozen permits in other states with similar provisions for similar processes. (and state regs)

- Helped the mill identify a couple of strategies to respond to the draft language.
  - No precedence
  - Process unit probably didn't need the exemption

Clean Condensate Alternative (CCA) Review

- **What:** Facility wants to evaluate or modify using the CCA for Subpart S NESHAP.
- **Why:** CCA is a compliance option that may be used as an alternative to HVLC collection and control. Many CCA's were set up years ago and may need to be modified to fit upcoming process changes.
- **Role of NCASI Research:** NCASI has been involved in every step of the process across dozens of CCA exercises.

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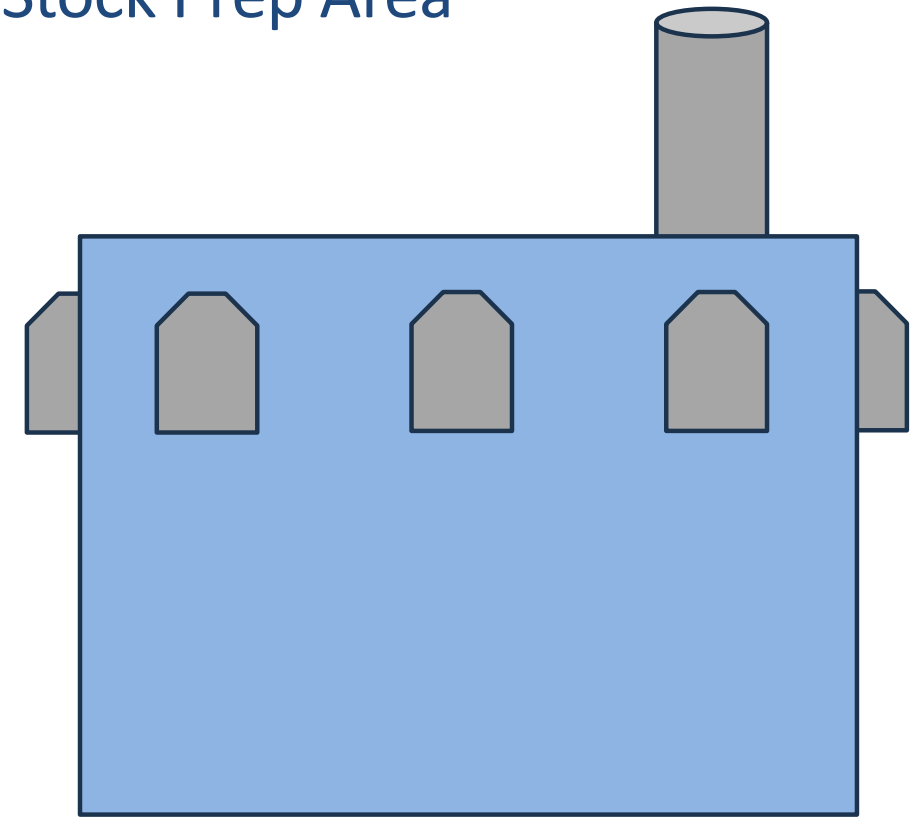
NCASI Member Support – Case Studies

Stack Testing

Stack Test Planning for Stock Prep Area

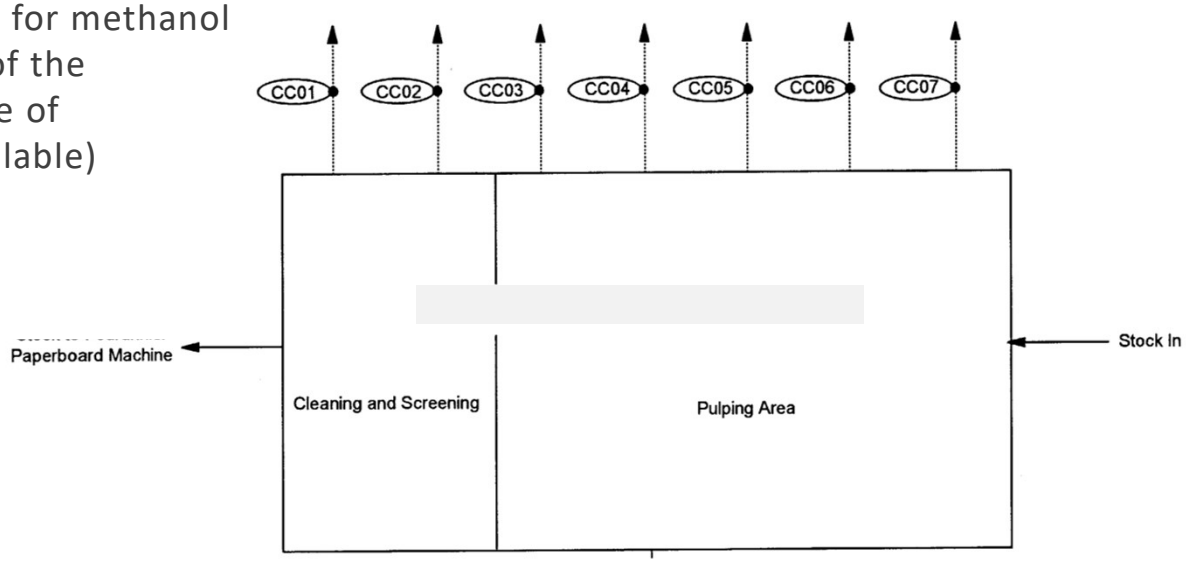
- Facility used NCASI emission factors for recycled stock prep.
  - Organic Air Toxics
  - VOC
- State asked for confirmation testing

- Problem:
  - Equipment was in an open-air building
  - Dozens of side building vents
  - Expected concentrations were very low or non-detect (~ambient).



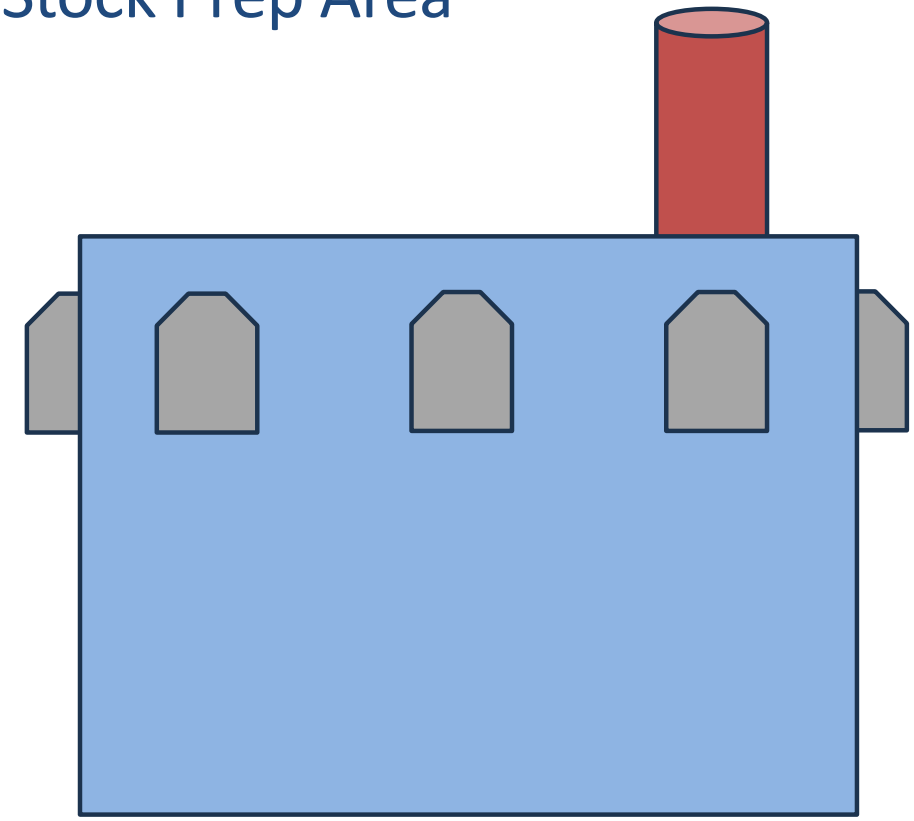
Stack Test Planning for Stock Prep Area

- **Solution**
  - Building had one accessible fan duct over one piece of the process
  - NCASI Test data indicated that for methanol and VOC an average of ~40% of the emissions were from this piece of equipment. (2 test events available)



Stack Test Planning for Stock Prep Area

- **Solution**
  - Building had one fan duct over one piece of the process
  - NCASI Test data indicated that for methanol and VOC ~40% of the emissions were from **this piece of equipment**
  - Facility proposed testing the fan and then adjusting the emissions total.
  - NCASI developed justification for approach.
    - Vent level test data.
    - Air toxics track methanol and VOC.
  - NCASI helped design target concentrations to avoid an ND higher than the EF used.
    - Adjusted run times and liquid sample volumes.

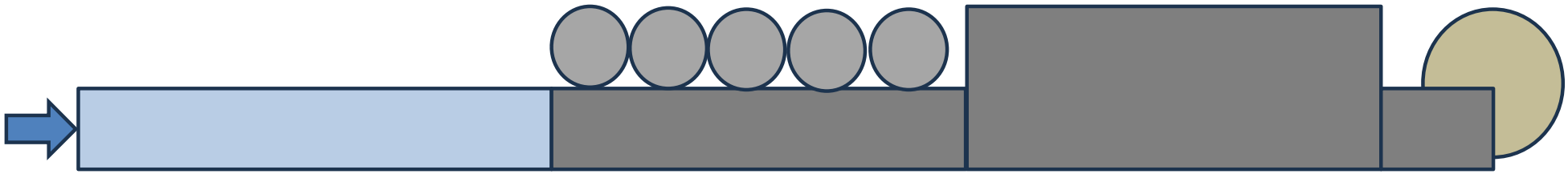


Stack Test Planning for Paper Machine

- Facility needed to test emissions of air toxics from a paper machine

- **Problem**
  - High number of vents, access issues
  - Expected concentrations were very low or non-detect (~ambient).
  - Not possible to get low enough detection limits for some test methods.

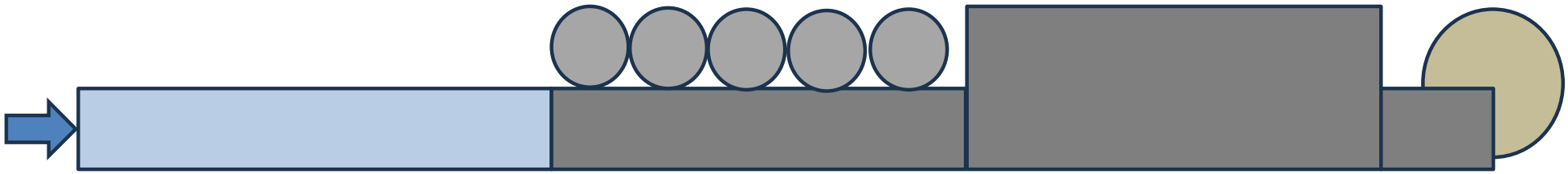
- NCASI paper machine testing was made up of 5-15 individual vents.
  - Could largely be broken up into “wet-end” and “dry-end “.
  - Organic air toxic emissions probably don’t need isokinetic testing.



Stack Test Planning for Paper Machine

- **Solution 1:**
  - Test a single “wet-end” and “dry-end” vent and use that concentration with fan curves for the rest of the machine vents.
  - NCASI developed justification and demonstration of approach.

- **Solution 2:**
  - Chemical was not expected to be generated at the paper machine.
  - Emissions due to stock and whitewater content.
  - Measure stock concentration, combine with stock flow rate and calculate a “maximum emitted” is 100% loss.
  - Still required very low detection limits.



Stack Test Report Review – NCASI Activities

- Check Calculations
- Check Analytical Results
- Troubleshoot Operations

OVERVIEW OF AUDIT TOOL FOR US EPA METHOD 5

Lee Carlson

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AUGUST 2024

Audit Tool Features

- **ORGANIZED BY EPA METHOD**
  - **Methods 1 through 5 covered**
- **DEDICATED WORKSHEET FOR EACH METHOD**
  - **Quality assurance**
  - **Data entry**
  - **Calculations**
  - **Will accommodate English and metric units**
- **SUMMARY WORKSHEET FOR QUICK EVALUATION OF RESULTS**

Audit Tool Features (continued)

- **METHOD 5 WORKSHEET**
  - **Emissions calculated as a concentration, mass emission rate, custom production-based, and mass per unit of heat input basis**
  - **User-defined emissions calculations**
    - **Pounds per ton of product**
    - **Pounds per thousand square feet 3/8-inch basis**
    - **Pounds per ton of black liquor solids fired**
    - **Etc.**
  - **Mass per unit of heat input per EPA Method 19**
    - **Provides for entry of custom F-factors**
    - **Option to choose fuel type and F-factors from EPA Method 19 Table 19-2**
    - **Option for direct entry of heat input rate**

Where do I find this audit tool?

3-Run and 15-Run audit tools for Method 5 are available here:

From NCASI home page: Resources> Tools & Calculators> USEPA Method 5 Audit Tool

https://www.ncasi.org/resource/us-epa-method-5-audit-tool/

A recording of the Method 5 Audit Tool Workshop conducted at NCASI's 2023 annual conference is also available on this same web page

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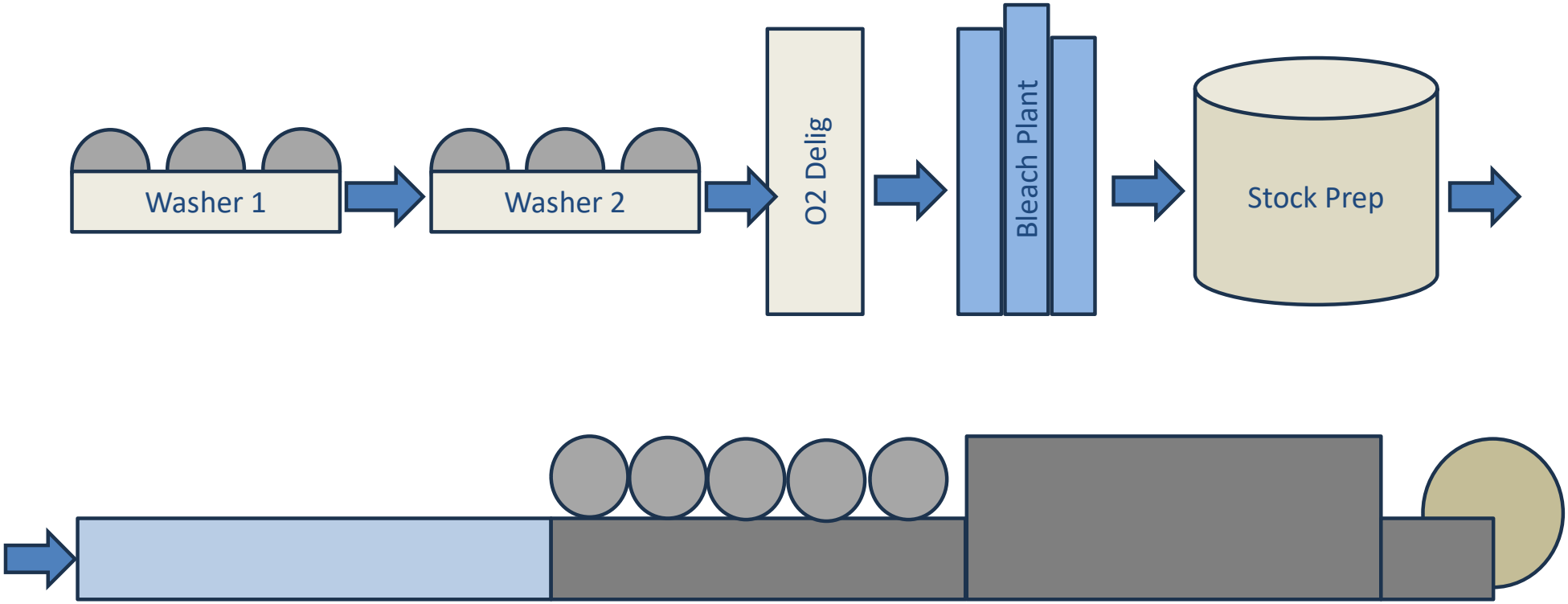
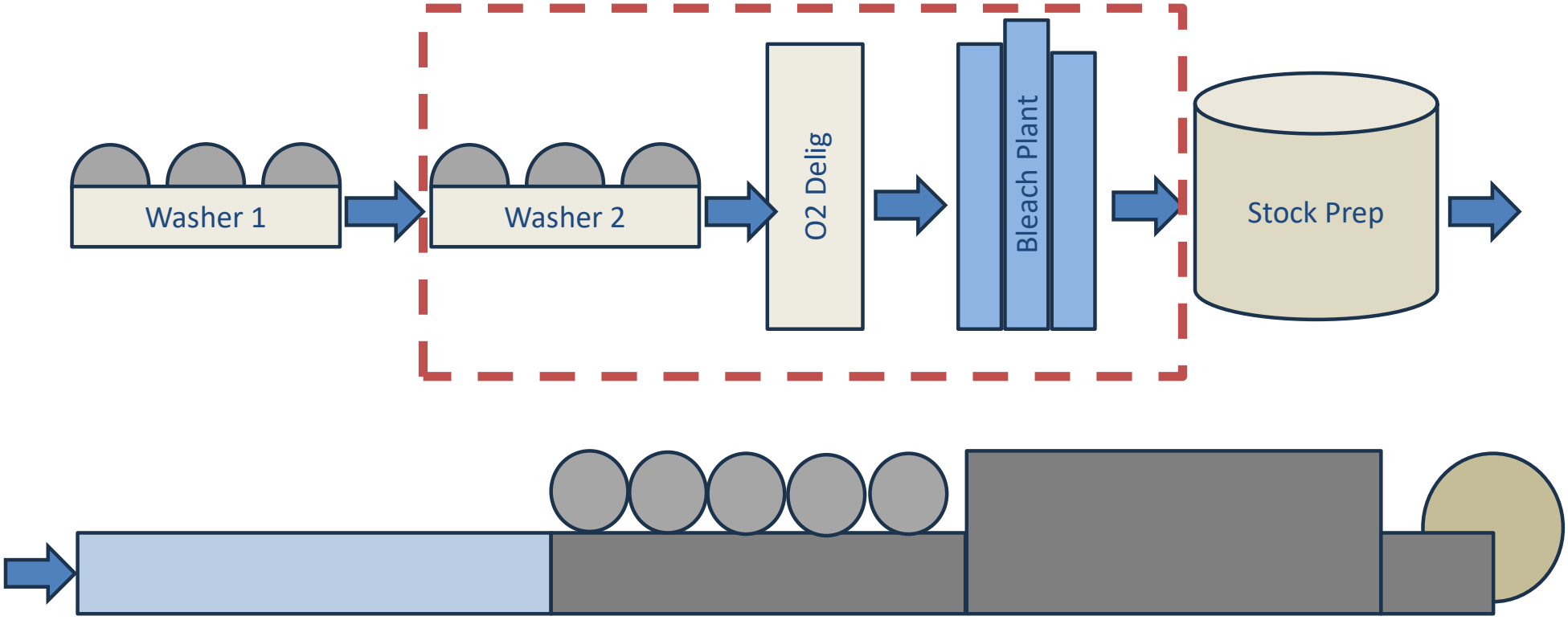
NCASI Member Support – Case Studies

Emission Estimates

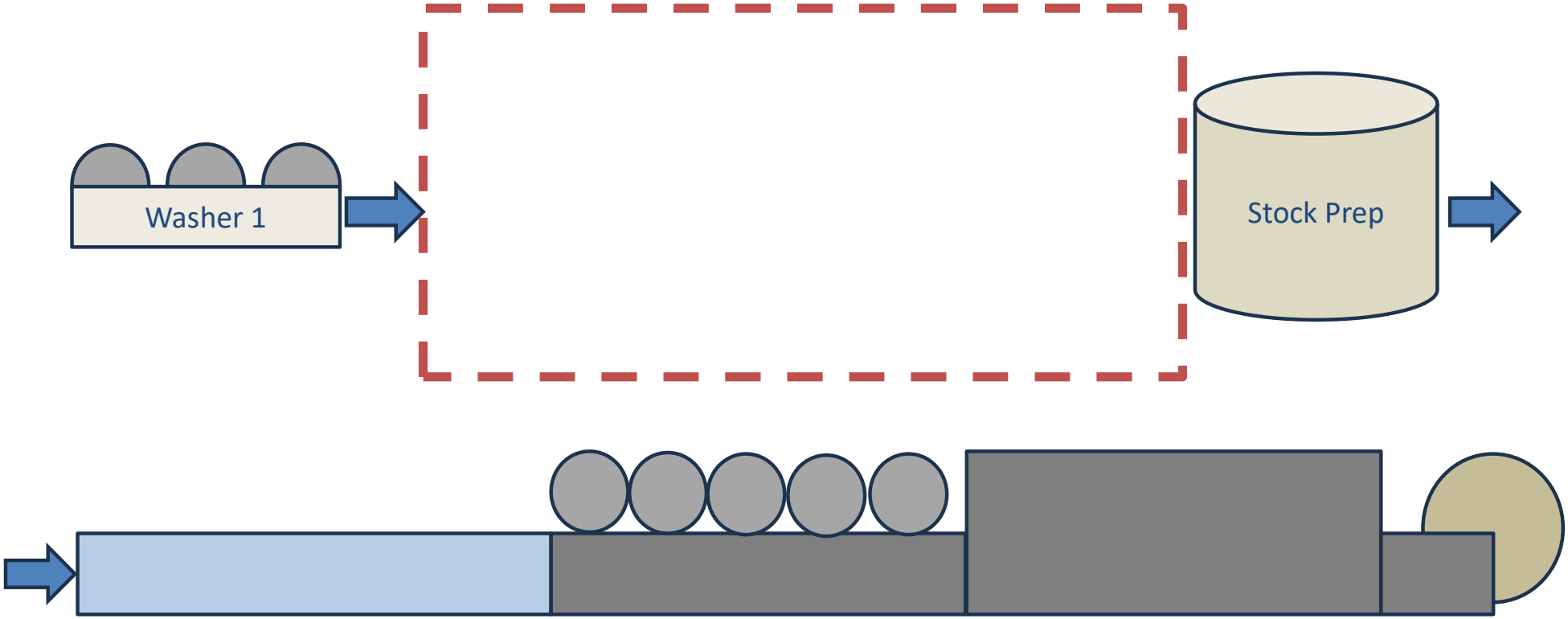
Paper Machine Estimates



Paper Machine Estimates



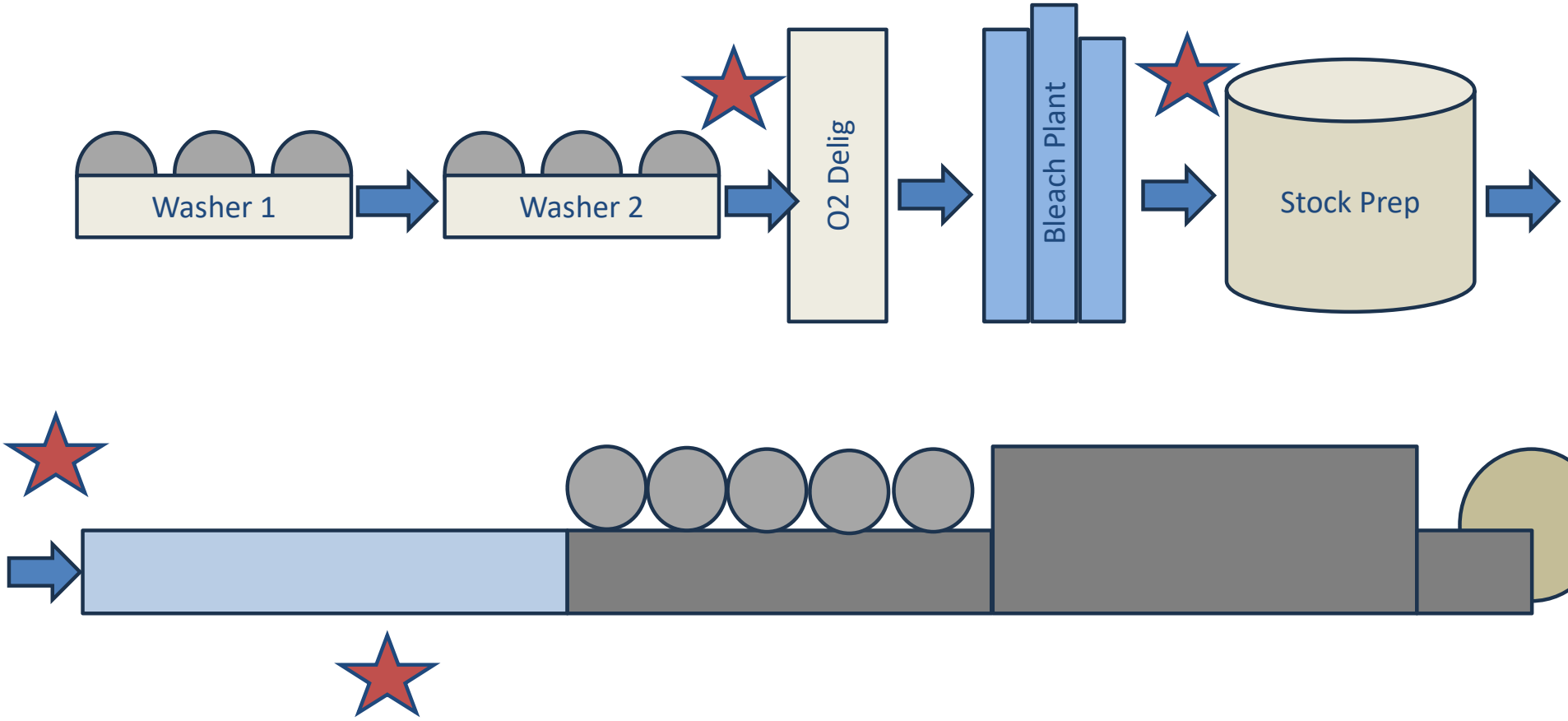
Paper Machine Estimates



Paper Machine Estimates

- Needed to estimate emissions when bypassing some washers, O2 delig and the bleach plant.
- VOC emission factor for unbleached paper machine is high.
- Emissions are largely a function of concentrations in the whitewater, which would be lower for bleached mill even when bypassing the bleach plant.

Paper Machine Estimates



Paper Machine Estimates

- Needed to estimate emissions when bypassing some washers, O2 delig and the bleach plant.
- VOC emission factor for unbleached paper machine is high.
- Emissions are largely a function of concentrations in the whitewater, which would be lower for bleached mill even when bypassing the bleach plant.

- Facility collected liquid samples for NCASI methanol analysis.
  - Brownstock
  - Bleached stock
  - Stock to paper machine
  - Whitewater
- Calculated “dilution” at each stage in the process to estimate the whitewater methanol concentration in the new configuration.
- Used simulated methanol concentration to estimate paper machine emissions.

NCG Combustion Characteristics

- Facility was evaluating burning LVHCs in the biomass boiler as a backup. Boiler operators wanted information on the combustion characteristics of the NCGs.

- Facility specifications
  - Hardwood/softwood split (several years of data)
  - No SOGs

NCG Combustion Characteristics

- Used NCASI WP-20-05 and refined for site specific conditions.
- NCASI developed site-specific estimates (range and average) for
  - Chemical Speciation
  - BTU Content
  - Sulfur Content
  - NCG Volume

NCASI Member Support – Case Studies

Regulatory & Permitting

Stack Test Planning and Review

Emission Estimates

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2024 NCASI Conference
October 1-3, 2024
Vancouver, WA

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Air Quality Highlights

- **Workshop:** Planning for EPA's Upcoming Pulp Mill Information Collection Request
- **Manufacturing Case Studies**
  - **Condensate Pretreatment**
  - **Permitting Experiences for Air Toxics**
- **Air 1:** Regulatory Outlook
  - Update from EPA OAQPS
  - OR and WA Regulators
- **Air 2:** Emerging Topics
  - NCASI Monitoring Study
  - Electronic Reporting
  - NCASI Research

Please call us with questions or comments!

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