

Premcor Delaware City Refinery

FCCU 20 ppm NO_x Project



**Coastal Zone Permit
Public Hearing**

April 30, 2008

*Tom Godlewski
Sr. Environmental Engineer
Delaware City Refinery*

Representing the Refinery

- ❑ Valero DCR Personnel
 - **Tom Godlewski, Sr. Environmental Engineer**
 - **Heather Chelpaty, Environmental Manager**
 - **David Billingsley, Staff Process Engineer**

- ❑ Environ International Corporation
 - **Meint Olthof, Ph.D, P.E., Senior Manager**

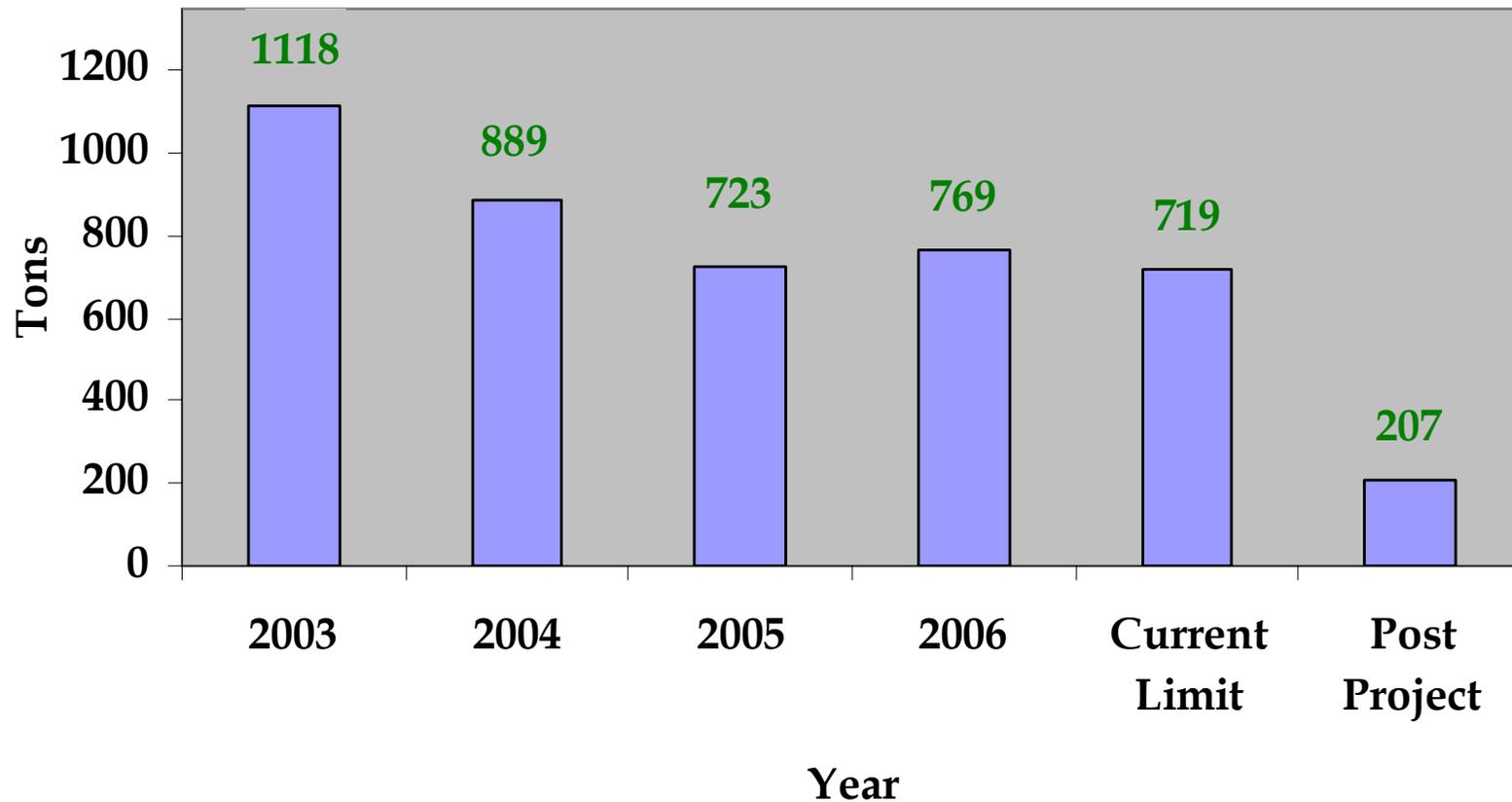
- ❑ To install pollution control equipment to comply with the conditions of an Agreement entered in to by DNREC and Premcor on July 6, 2006 aimed at reducing oxides of nitrogen (NO_x) emissions from the FCCU to 20 ppm (dry, 0% O₂ corrected basis) on an annual average.
- ❑ To select a technology capable of meeting the emission limitations in the Agreement and able to be integrated into the existing SO₂ and Particulate Matter pollution control equipment installed at the FCCU in December 2006
- ❑ To implement the technology and mitigate any negative project impacts to the extent feasible in accordance with the requirements of DNREC's Regulations Governing Delaware's Coastal Zone

Air Emissions Decrease of at least 512.5 TPY NO_x

What is NO_x?

- ❑ **Nitrogen oxides**, or NO_x, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts.
- ❑ NO_x forms when fuel is burned at high temperatures, as in a combustion process. The primary manmade sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. NO_x can also be formed naturally.
- ❑ NO_x is one of the main ingredients involved in the formation of ground-level ozone (smog), which can trigger serious respiratory problems.
 - **New Castle County is in an area designated as moderate non-attainment for ozone**

FCCU NO_x Emissions by Year



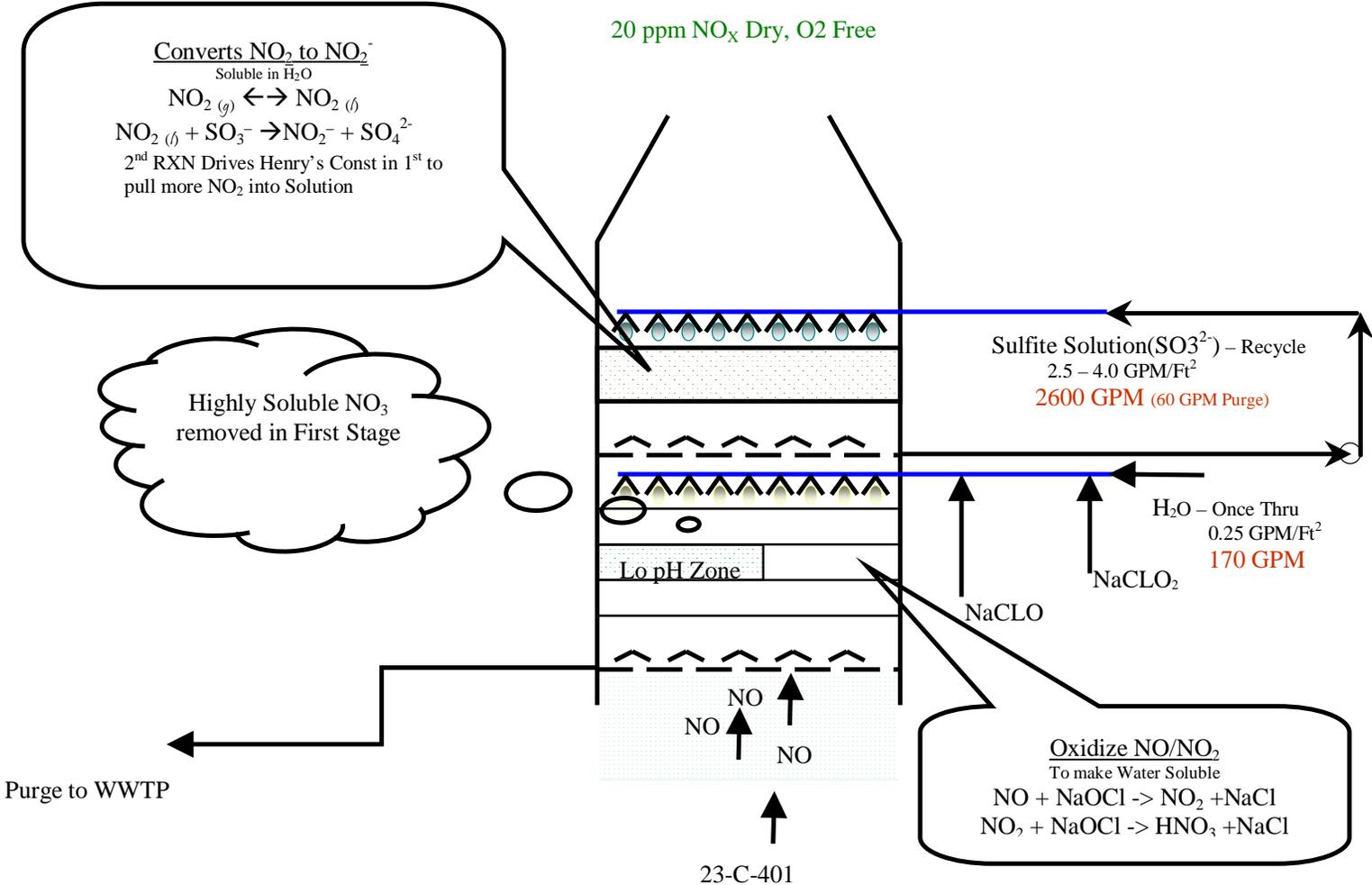
Based on Refinery Emission Inventory Submittals

- ❑ Wet Gas Scrubber Plus (WGS+) technology to be installed downstream of the existing particulate and sulfur dioxide control devices.
 - Top of existing vessel will cut off and a new ~20-30' section for WGS+ will be installed.
 - NO_x will be “scrubbed” out of the flue gas stream and resulting purge liquid will be sent to the Waste Water Treatment Plant for processing.

- ❑ Modify 1st stage of the existing Waste Water Treatment Plant to mitigate nitrate effluent increase.
 - Modification targets 80% - 90% removal of nitrates generated by the project

Wet Gas Scrubber Plus Technology Overview

Developed by ExxonMobil, licensed by Hamon Research-Cottrell



- ❑ Air permit application submitted to Air Quality Management Division on June 1, 2007

- ❑ Coastal Zone Status Decision submitted on Aug. 1, 2007
 - Project is strictly a pollution control project
 - No significant negative environmental impacts
 - Sec. Hughes decision on Nov. 14, 2007 that a Coastal Zone permit would be required due to increased effluent discharges to DE River

- ❑ Coastal Zone Permit Application Submitted Dec. 28, 2007

**Air Permits must be issued by July 1, 2008 to Meet Implementation
Schedule for May 2009 FCCU Process Turnaround per Agreement with
DNREC**

❑ **Project Description**

❑ **Impact Analysis**

- Environmental Impacts
- Economic Impacts
- Aesthetic Effects

Full Application Available on DNREC Website

❑ Sulfates (SO_4^{2-})

- Calculated 13 mg/L increase in refinery Outfall 001 to the DE River (increasing to ~ 420 mg/L)
- Sulfate fluctuations in DCR vicinity of DE river can be over 900 mg/L due to tidal influence
- Conclusion: Increased sulfate loading is well within natural occurring levels of sulfate concentration.

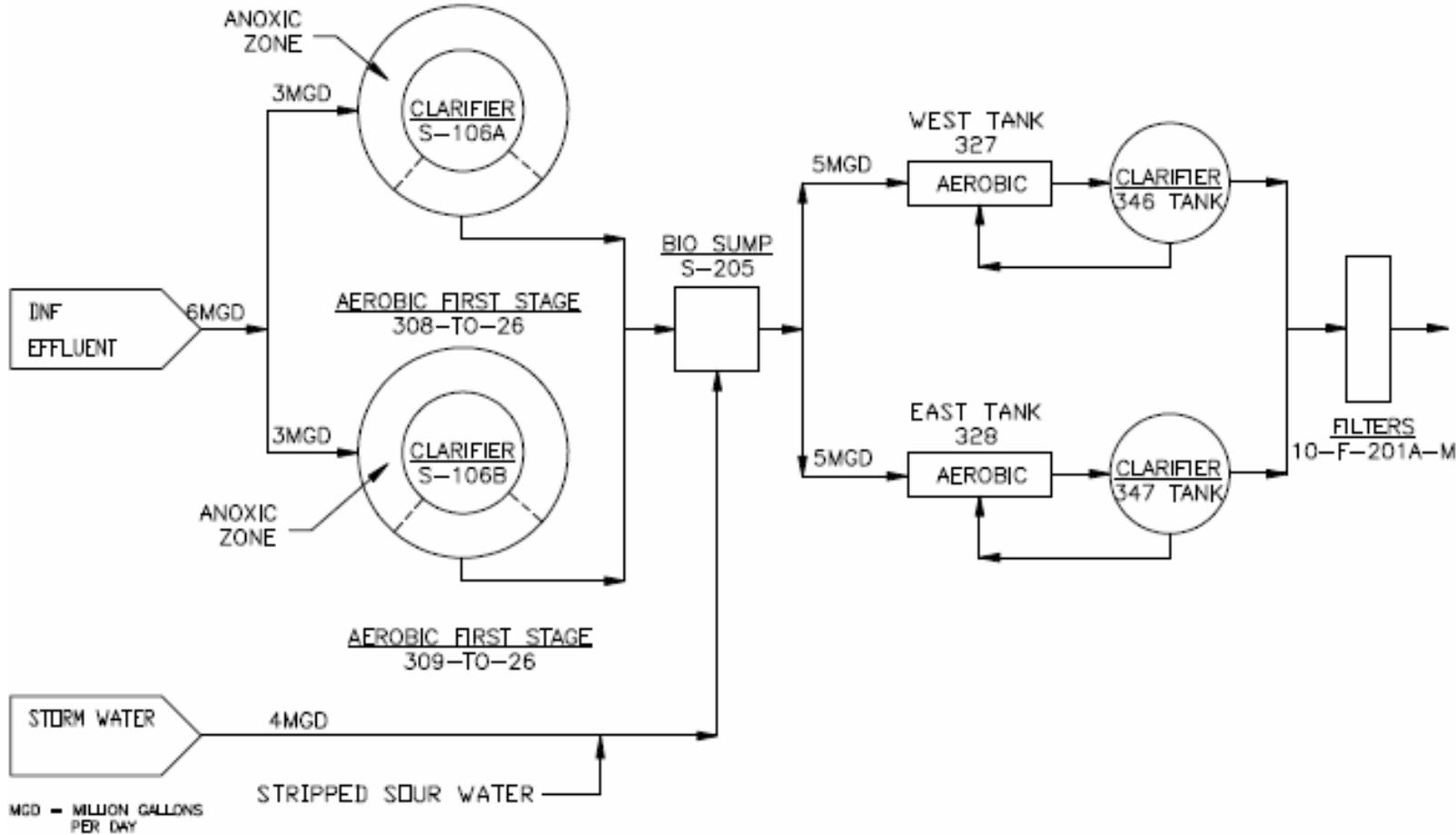
❑ Chlorides (Cl^-)

- Also naturally occurring in seawater
- Estimated chloride concentration in DCR area: 2,900 mg/L
- Project impact of 2 mg/L is negligible and within normal naturally occurring variation.

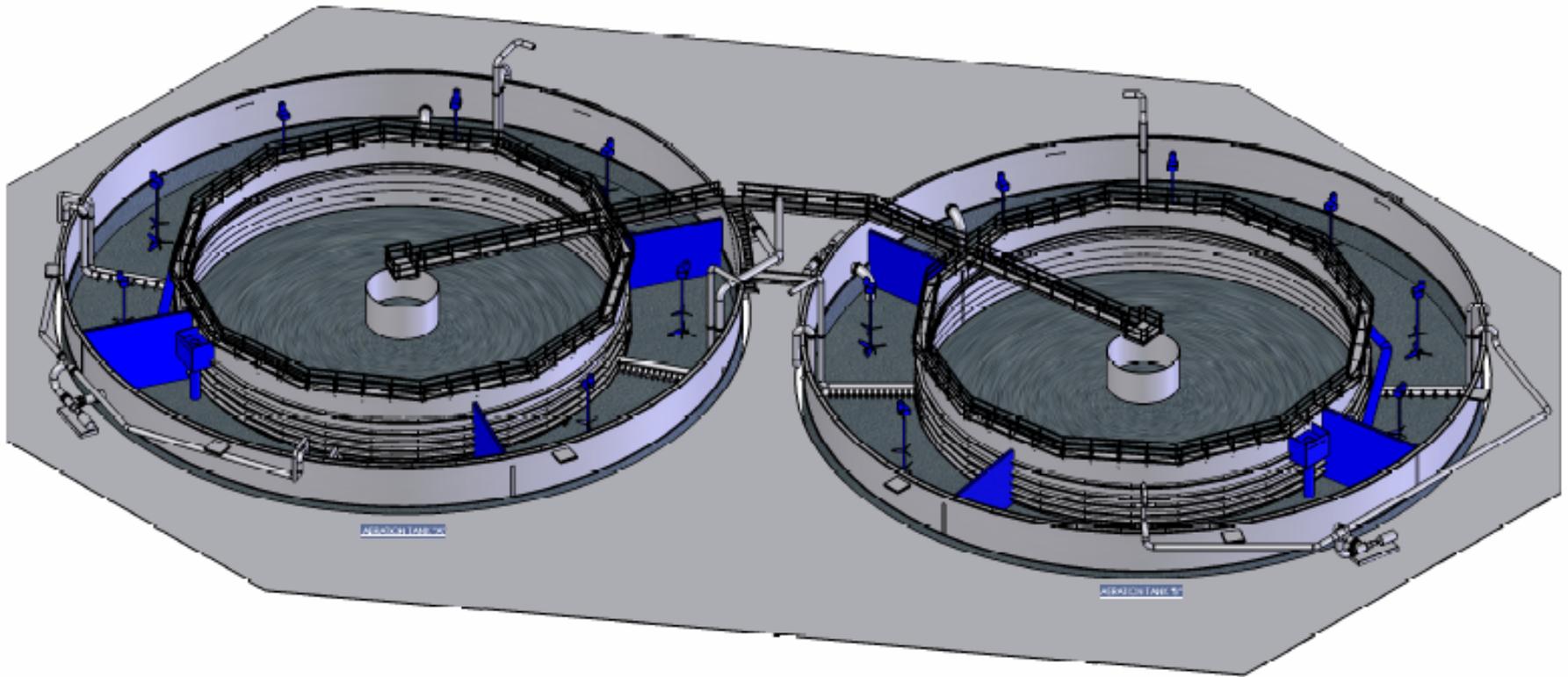
Increases of these constituents are within ranges found normally in nature

- ❑ **Nitrate (NO_3^- as N) Impacts with No WWTP Modifications**
 - Nitrates are not regulated compounds under the refinery NPDES water discharge permit
 - Conservative estimate is a maximum of 219 TPY nitrates generated by WGS+
 - Existing concentration of DCR Effluent to DE River : ~2.0 mg/L
 - Post Project calculated concentration: ~2.5 mg/L
 - Impact after complete mixing in DE River: 0.01 mg/L
- ❑ **The Delaware River Basin Commission has noted that current nutrient concentrations are elevated in this area of the DE River**
 - No signs of eutrophication (fish kills, algal blooms, etc.)
 - No apparent other aquatic impacts
 - To protect dissolved oxygen levels from decreasing, the DRBC may set a TMDL limit
 - Current DE River concentration near the DCR: 1.5 mg/L

In light of the nitrate impact concerns, Premcor voluntarily undertakes a multimillion dollar WWTP modification to reduce the nitrates impact



Computer modeling and pilot plant studies show no negative impact on existing organic removal rates



1st Stage Biological Treatment Tanks Modifications

- ❑ **Significant capital investment to address nitrate concerns**
- ❑ **Nitrate (NO_3^- as N) Impacts**
 - Nitrates impact after WWTP 1st Stage Biological treatment modifications **reduced from 219 TPY to 33 TPY**
 - Impacts at Outfall 001 is projected to be very small following the WWTP modifications
 - 0.06 mg/L above existing average discharge of 2.0 mg/L
 - Impact on DE River after complete mixing: 0.002 mg/L
- ❑ **Project impact on DE River is not statistically significant**
 - 0.002 mg/L impact on mean reported value of 1.5 mg/L for Pea Patch Island area
 - DRBC has not yet established acceptable mass loading limits for total Nitrogen (EPA deadline is 2019)

Impact on DE River from increased nitrate is “zero” when considering significant figures

□ Air Emissions:

Pollutant	Emissions Impact	% Increase / Decrease
NO _x	-512.5 TPY	71.2% dec. FCCU 18.0% dec. Refinery wide

→ Refinery wide decrease based on 2006 Emission Inventory Total

□ WWTP Effluent Discharges to DE River

Constituent	Incremental Increase (TPY)	% Increase over Current Discharge to DE River Outfall 001
NO ₃ ⁻ (as N)	33 TPY	3.0%
SO ₄ ²⁻	6,846 TPY	3.1%
Cl ⁻	1,267 TPY	0.08%

Nitrates, Sulfates and Chlorides are not regulated by the current refinery NPDES discharge permit

- ❑ **DCR is located within non-attainment area for ozone**
 - NO_x is well known ozone precursor
 - NO_x reductions are significant and important to DNREC's ambient air quality attainment goals

- ❑ **Water impacts**
 - Evaluation shows impacts are statistically neutral

- ❑ **No further environmental offsets required to meet CZ Regulatory Standards:**
 - Project is “clearly and demonstrably more beneficial to the environment in the Coastal Zone” (Coastal Zone standard)

Project meets Environmental Requirements of the Coastal Zone Regulations

❑ Workforce

- Project will require 50 workers prior to the turnaround
 - Estimated 30 from Delaware
- Project will require approximately 150 workers for the turnaround
 - Estimated 30 from Delaware

❑ Weekly Construction Payroll

- \$300,000 per week prior to the turnaround
- \$1,575,000 per week during the turnaround

❑ Construction Supplies

- \$8MM estimated to be purchased in Delaware (+/- 50%)

Current Estimate for the Project (WGS+ plus WWTP Modifications)
~ \$60,000,000 - \$80,000,000

- ❑ **All project work is within the existing footprint of the refinery**

- ❑ **The increase in height (20'-25') from the WGS+ addition may be noticeable from outside the facility**
 - This stack will remain below the heights of other nearby structures and will likely be unnoticeable

Project impacts will be aesthetically compatible with the existing facility and surrounding land use.

The Delaware City Refinery – FCCU Area

