

## **Northwest Innovation Works Methanol Plants**

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Northwest Innovation Works is associated with Chinese Academy of Science Holding Co., Ltd. Which is part of the Chinese government that develops and takes new technologies to market.

Three methanol plants, which convert natural gas to methanol, are being proposed:

- Tacoma, tide flats, Washington
- Port of Kalama, Washington
- Port of St. Helens, Oregon

### **Tacoma Methanol Plant – Blair Waterway at Port of Tacoma**

Site of former Kaiser Aluminum Smelter

30 year lease with the Port for 90 acre site

\$3.4 billion natural gas to methanol plant being proposed

2016 planned to begin construction

2020 planned to begin operations

### **Three Phase Process of Methanol Production**

Synthesis gas production (syngas) from natural gas

Synthesis of crude methanol

Methanol distillation

## **Synthesis gas production**

- Desulfurization –remove sulfur with zinc oxide and produce zinc sulfide
- Pre-reforming of natural gas, steam methane reformer (SMR)
- Oxygen introduced as reforming agent

## **Methanol synthesis**

- Water cooled reactor, highly reactive catalyst
- Gas cooled reactor – catalyst bed
- Nickel and copper catalyst
- Raw methanol produced

## **Raw Methanol Distillation**

- Impurities separated into overhead vapor stream and product grade methanol

## **Three Propose Methanol Facilities**

Facilities are proposed to produce a total of 10.8 million metric tons of methanol per year.

Construction cost \$5.4 billion (\$1.8 billion per facility)

## **Kalama facility farther along**

It will have 200,000 metric tons of storage tank capacity

3-6 ships loaded per month

3.1 miles of 24" diameter natural gas pipeline from Williams NW Pipeline to the Port of Kalama – currently under Federal Energy Regulatory Commission (FERC) review

Construction scheduled to begin in 2016

Operations scheduled to begin in 2018

### **China Company Yuhuang Chemical, Inc. YCI Methanol Plant**

St. James Parish, Louisiana

1,100 acre site

Next to Plains all American Pipeline Terminal

Attractions for site – deepwater channel for ship access, cheap shale natural gas available

Plant to ship manufactured Methanol to China

\$1.85 billion dollar construction cost, \$9.5 million incentive package from the state of Louisiana and work force training

3 million tons of methanol per year

Permitted May 2015, permit under appeal

Construction to begin in 2016

Operations scheduled for 2018

Same process as 3 Northwest Innovation Works facilities

## **Air Emissions permitted to be released by YCI Methanol Plant**

Minor source of criteria pollutants

Major source of federally regulated Hazardous Air Pollutants (HAPs)

Major source of Toxic Air Pollutants (TAPs)

These chemicals are known or suspected cancer causing agents or cause serious health effects

The toxic chemicals to be released in the largest quantities are:

Benzene

Formaldehyde

Methanol

Naphthalene

Toluene

Methanol is a Hazardous Air Pollutant

## **Green House Gases**

Because the facility will be a minor source of criteria pollutants, emissions of greenhouse gases (carbon dioxide equivalents CO<sub>2</sub>e) need not be quantified or addressed by the permit.

A gas to liquid project converting natural gas to diesel fuel and liquefied petroleum gas in Louisiana will release 5.78 million tons of green house gases per year and 673 tons of Volatile Organic Compounds per year. Based on those figures, the proposed methanol facilities could release 578,000 tons of greenhouse gases per year.

## Permit conditions for the YCI Methanol plant air emissions

PM10	59.37 tons per year
PM2.5	57.92 tons per year
SO2	4.79 tons per year
NOX	85.45 tons per year
CO	88.08 tons per year
Ammonia	31.72 tons per year
VOC	78.39 tons per year

VOCs consist of:

Benzene	0.03 tons per year
Formaldehyde	0.56 tons per year
Methanol	40.52 tons per year
n-Hexane	13.35 tons per year
Naphthalene	0.02 tons per year
Toluene	0.03 tons per year

## **YCI Methanol Facility Units**

Steam Methane Reformer

Auxiliary Boiler

Flare

Emergency Generator

Cooling water tower

Crude methanol tank

5 Methanol production tanks

Ammonia tank

Truck/Rail Car/Loading operations

Marine loading operations

Fugitive emissions

Waste water treatment unit

Administrative Building

Power generating facility

## **YCI Methane Facility Units Highest Quantity of Air Emissions**

### **PM10 and PM2.5**

Steam Methane Reformer

Auxiliary Boiler

Cooling Water Tower

## **SO<sub>2</sub>**

Steam Methane Reformer

Auxiliary Boiler

Flare

## **NO<sub>x</sub>**

Steam Methane Reformer

Auxiliary Boiler

Flare

Emergency Generator

## **CO**

Auxiliary Boiler

Steam Methane Reformer

Flare

## **VOC**

Steam Methane Reformer

Auxiliary Boiler

Flare

## **Benzene**

Steam Methane Reformer

## **Formaldehyde**

Steam Methane Reformer

Auxiliary Boile

## **Methanol**

Steam Methane Reformer 4.61 tons per year

Flare 0.15 tons per year

Cooling Tower 8.65 tons per year

Truck/Rail Loading

Marine Loading

Fugitive emissions

Waste water treatment fugitives

Tanks 19.8 tons per year

## **Purpose of Flare**

To control emissions from distillation operations and/or reactor process during periods of start up/shut down/ malfunctions

During normal operations the flare will not be used to control emissions from distillation operations

Flare is not used as a control device

Flare releases methanol



## **Health Impacts of Chemicals Released by Methanol Facilities**

### **Benzene**

Known human carcinogen – leukemia

Teratogen in animals

Irritates skin, eyes, nose, throat

Causes coughing, wheezing, dizziness, headaches, lightheadedness

### **Formaldehyde**

Known human carcinogen – nasopharynx and leukemia

May damage developing fetus

Affects female fertility

Irritates lungs, skin, eyes, nose, throat

### **Naphthalene**

Probable carcinogen in human – larynx and intestines

Irritates skin, eyes, nose, throat

Causes headaches, fatigue, nausea and vomiting

### **Toluene**

May be teratogen

May damage developing fetus

Irritates skin, eyes, nose, throat

Affects nervous system

## **Methanol**

Flammable

Toxic to humans and animals

Causes nausea, vomiting, ocular injury, dizziness, headaches, muscle spasms

## **Routes of Exposure**

Inhalation

Ingestion

Skin and eye contact

Metabolized by the liver to form formaldehyde

## **Methanol Facilities in Washington and Oregon**

### **Natural Gas**

Natural Gas from the United States and Canada will fuel the methane facilities in Washington and Oregon.

The natural gas life cycle has very detrimental environmental and human health impacts.

The natural gas will be delivered by underground pipelines to the three facilities via the Williams North West pipeline.

Williams had an explosion at a gas processing facility along their pipeline in Gibson, Louisiana on October 8, 2015. Four workers were killed.

### **Water Usage**

10,000 gallons of water per minute (5.2 billion gallons per year) will be used by the Tacoma Methanol Facility. The water source is designated as the Tacoma municipal source.

The facility should be required to evaluate alternative sources of water such as surface water sources for at least part of the process water needs.

### **Waste Water**

Waste water generated by the facility will consist of process wastewater and storm water.

Information available indicates the waste water will be handled by the Port treatment plant. There is a need to determine if the Port facility is capable of handling the capacity of waste water and treating the contaminants to meet the discharge limits of the Port permit. In addition, the storm water discharge will require a waste water discharge permit.

## **Environmental Impact Statement**

According to T.C. Broadnax, City Manager for the City of Tacoma, in a letter to Claudia Riedener, the City will be the lead agency to prepare an Environmental Impact Statement for the Methanol Facility.

The EIS will be used by federal, state and local agencies to evaluate and make decisions on all necessary permits

Tacoma will conduct an independent assessment of the environmental risks, benefits, necessary conditions and mitigations that must be met to construct the proposed facility.

The scope of work for the EIS will be based on public out reach.

The state Department of Ecology may be the lead agency for the EIS.

There is a need to request a meeting with the City of Tacoma Planning and Development Services Department to determine the status of the scoping process for the EIS.

The Port performed some cleanup at the Kaiser facility.

There is a need for the EIS to address:

how clean is the site and how much contamination remains

the potential impacts when construction occurs on and in the contaminated soil

traffic impacts during construction and during operations

noise and dust impacts

toxic emissions

vulnerable zones – toxic and explosives

loading facility impacts

closeness to residents and commercial businesses

## **Permitting Processes**

Check on Air Permit process

Get a copy of the initial application as soon as filed

Waste water discharge application filed with the environmental agency

Pretreatment requirements for industrial discharge to the Port treatment system

Meet with Emergency Response agency

- Determine their ability to respond

- Trained personnel

- Equipment to address explosions and fires that may occur at the Methanol facility

- Evacuation routes

- Community notification system

State Regulatory Agency

- How frequently will the facility be inspected

- Reporting requirements – will reports be made immediately available to the public

- Accidental releases and upset conditions

- How notify

- How quickly respond

- Who issues evacuation or shelter in place orders

Consider initiating Odor and Symptom log process to track events

Consider conducting background Health Survey before construction and operations activities begin.