

*[From Northwest Innovation Works, January 2014]*

## Questions Regarding the Proposed Methanol Plant at Port Westward

### 1. What is the footprint of the project on the site?

Our proposed plant will require approximately 80 to 90 acres. More land may be necessary if we expand.

### 2. What will the plant look like?

The plant in the photograph below includes elements that will be similar to the facility we propose to construct at Port Westward. This illustrative plant is located in Trinidad and is owned by the Southern Chemical Company, Houston, TX.



### 3. What is the market for methanol?

The Xizhong Island Petrochemical Park in Dalian, China has signed agreements committing to purchase methanol from Northwest Innovation Works projects. Construction is already under way on storage facilities in Dalian to accommodate methanol produced by Northwest Innovation Works.

The methanol will be used to produce olefins, which serve as a building block for many common materials including plastics. The current demand for methanol for olefin production exceeds the available supply, particularly methanol from sources cleaner than coal.

**4. Why are you looking at multiple sites in Oregon and Washington?**

Our investor customer needs more methanol than we can produce with one or two plants. We intend to permit and construct at least two plants concurrently and hope to build additional plants after that. We have begun discussions with other locations for possible additional plants and we will explore the possibility of future expansion of the plants proposed for Port Westward and Kalama.

**5. What byproducts or wastes are associated with making methanol from natural gas?**

The methanol production process includes use of catalysts to separate the natural gas into oxygen, carbon and hydrogen and to synthesize or reform these elements into methanol. After a few years, these catalysts become spent and have to be replaced. The principal catalysts used in the reforming process are based on nickel and copper. When these catalysts are spent, they are normally sent to a specialized recycler that processes them to recover the valuable metals.

Zinc oxide is used to remove sulfur from the natural gas. This desulfurization process produces zinc sulfide as a byproduct. Zinc sulfide is typically sent to a specialized recycler to be processed to produce sulfide product.

**6. What is zinc oxide and how is it used?**

Zinc oxide is a chemical commonly found in topical skin ointments as a sunblock. It is a product the facility will purchase and use to help remove impurities from the natural gas from the pipeline.

**7. What pollutants will the plant release into the air?**

Emissions from the plant will be almost entirely from the combustion of natural gas and will include carbon dioxide, carbon monoxide, nitrogen oxide, sulfur dioxide, volatile organic compounds and fine particulate. These are the same pollutants that come from any natural gas combustion--from a residential gas furnace to a natural gas power plant. The relative proportions of these pollutants from methanol production, however, are different from simple combustion because some of the combustion byproducts are converted to methanol or to nitrogen gas.

Northwest Innovation Works will need to obtain an air quality construction permit from the Oregon Department of Environmental Quality and will be subject to rules requiring best available control technology for its emissions.

**8. How much water will the facility use?**

Depending on how the facility is designed, it may use more than 2500 gallons per minute of water for cooling and for the gas reforming process. The cooling water will be recycled many

times through various processes to limit water use. Approximately 90 percent of that water will be consumed during the process or will be lost as vapor to the atmosphere.

**9. Where will the water come from?**

We expect to obtain water from the Port. The Port will allow NWIW to use up to 2,750 gallons per minute from its existing water system, which draws its water supply from the Columbia River.

**10. How much wastewater will the facility produce and how will it be discharged?**

Depending on how the facility is designed, it may discharge roughly 200 gallons per minute of wastewater. Most of this wastewater will be cooling water, which will be discharged after going through several cycles as described under item 12 below.

The Port currently holds a National Pollutant Discharge Elimination System (NPDES), and can accept our wastewater and discharge it through its existing wastewater management system with proper mitigation as required under the permit.

**11. Is there sufficient sewer service for the project?**

Sewage from our rest rooms will be treated and disposed through an onsite septic system.

**12. What role does steam play in the process?**

Our process will require heat, which will be provided by steam from a boiler. Steam also will be used to provide hydrogen and oxygen to form methanol. Of course, we will be conserving energy and water through various heat exchanges. Cooling water will be recycled many times through our cooling towers.

**13. How much electricity will the plant consume?**

The initial plant we have proposed will need approximately 200 mw/day.

**14. How much truck traffic will be generated by your operation?**

Prior to any permit applications we will conduct a traffic impact study and share those results with the Port. During operations, we will have daily traffic consistent with our estimated 120 employees working three shifts. We can also assume two delivery trucks per days.

**15. What will be the main access to the site?**

The access main access will be Kallunki Road. Should Hermo Road be improved, Hermo Road may be considered the main access to the site.

## **16. Is methanol dangerous to humans and animals?**

Methanol is toxic to humans and animals. However, the U.S. Environmental Protection Agency (August 1994 chemicals in the Environment: Methanol) described methanol as biodegradable and not carcinogenic.

A 2011 article written by Duke University environmental scientists and published in the journal "Environmental Policy" concludes: "Methanol poses little long-term threat to ecosystems because it is biodegraded quickly in both aerobic and anaerobic conditions and therefore is unlikely to accumulate in the environment." ("China's growing methanol economy and its implications for energy and the environment," by Chi-Jen Yang and Robert B. Jackson, Energy Policy, Nov. 2011.)

At the same time, experts and industry representatives recognize methanol is a dangerous chemical that needs to be handled by professionally trained technicians.

## **17. What happens to methanol if it is spilled?**

Methanol evaporates quickly at ambient temperatures. It is the simplest of alcohols, with a molecule consisting of only carbon, hydrogen and oxygen. In the atmosphere, sunlight helps it degrade to carbon dioxide and water. If released to soil, bacteria will break it down to carbon dioxide and water.

## **18. Is methanol flammable as a liquid or a gas?**

Methanol is a flammable liquid at room temperature. Methanol vapor in a confined space also is combustible. There's no question that methanol can be dangerous in certain situations but it is not when handled with care. That is why Northwest Innovation Works will work closely with the Port and the local fire department to develop comprehensive safety plans.

## **19. What is the difference between LNG and methanol?**

The two are very different. Northwest Innovation Works product and processes will not be similar to LNG.

LNG is liquefied natural gas which must be pressured and stored cryogenically. LNG requires highly specialized facilities for storage, loading and transport of a natural resource material.

Methanol is a value-added manufactured product; it is not simply natural gas in another physical form. It is stored and handled at ambient temperatures and pressures.

**20. What is Northwest Innovation Works doing to protect the safety of workers and surrounding businesses and residents in and around Port Westward?**

Northwest Innovation Works will design the plant with controls to avoid spills, fires and other risks to the public and the environment. As a new plant, the engineering and design of the facility will be state-of-the-art. On-site storage facilities will be designed with redundant containment systems.

Northwest Innovation Works will prepare an emergency response plan and will have its own emergency response capabilities. We also will be working with the local fire district to supplement on-site emergency response capabilities.

**21. With an ethanol plant and oil terminal nearby, how can the public be certain the area will be safe?**

Northwest Innovation Works plants will rely upon the latest technology, which includes safety controls and backup systems. Northwest Innovation Works is committed to working with port officials and other facilities at the port to ensure coordinated planning and emergency response.

**22. How much methanol will be stored at this site?**

We will need to store some inventory on site before it is shipped. We expect to construct storage facilities for between 50,000 and 100,000 tons of methanol product which is 10 to 20 days of production.

**23. Could the plant be used to produce methanol from coal?**

No. The process for producing methanol from coal is very different and would require a different plant infrastructure. The proposed plant would produce methanol only from natural gas. Northwest Innovation Works' Chinese investors, including the Chinese government, want to produce methanol from natural gas because it is more cost effective than coal and because it has much lower environmental impacts.

**24. What permits will the plant require?**

We have not begun permitting for the proposed plant. We expect the plant to require an air permit from the Oregon Department of Environmental Quality (DEQ) and local land use approvals. We also will need to register under the general industrial stormwater permit issued by DEQ. Depending on how the plant is sited, it may require permits from the US Army Corps of Engineers and the Oregon Department of State Lands to fill wetlands, which would include requirements to comply with the National Environmental Policy Act.

**25. How long will the permitting take?**

We hope to complete the permitting in about a year, although it could take longer.

**26. How much energy does it take to manufacture methanol from natural gas?**

Depending on plant design and the quality of the natural gas, approximately 70 percent of the natural gas Northwest Innovation works will consume will be converted to methanol. The remainder will be combusted to produce the energy necessary for the chemical processes.

**27. Where will the gas come from?**

We would expect to purchase natural gas from a local natural gas supplier. Gas for the proposed plant will be delivered via an existing natural gas pipeline.

**28. Is there sufficient gas to meet the demand without adversely impacting local ratepayers?**

Potential gas suppliers have told us that they can meet the natural gas needs of the proposed plant at Port Westward without any negative impact on existing ratepayers.

**29. How much gas will be stored on site?**

We will not be constructing storage facilities for natural gas. We will take our gas directly from the pipeline to our processes.

**30. Will the plant be open to union work?**

Yes.

**31. What tax abatements will Northwest Innovation Works pursue?**

We look forward to discussing potential tax abatements with our state and local partners. Certainly, however, a \$1 billion plant will generate substantial tax revenues in the communities where we operate.

**32. When was Northwest Innovation Works, LLC formed?**

Northwest Innovation Works, LLC is a new company formed for the purposes of developing methanol plants in the Pacific Northwest. It does not have any existing operations. Northwest Innovation Works was formed by the Chinese Academy of Sciences Holdings Co., Ltd. (part of the Chinese government that develops and takes to market new technologies. For example, CAS owns Lenovo), BP Global Investments Limited (part of BP), Dalian Xizhong Island Petrochemical Industrial Park Development Co., Ltd. (a government-owned company that is developing a world class petrochemical plant in Dalian, China) and H&Q Asia Pacific (a well-established private equity firm in Palo Alto, California).

**33. Will Northwest Innovation Works work with local partners when it begins hiring?**

Yes. Our plants will need managers, engineers and skilled workers. Northwest Innovation Works expects to collaborate with local partners to find the most qualified employees.

**34. How much will Northwest Innovation Works pay its employees?**

Salaries will be commensurate with the position and skills involved. Northwest Innovation Works is committed to offering employees family-living wages and benefits.