Q. Please introduce yourself to the Council

A. My name is William Martin and my business address is: Anvil Corporation, 1675 W. Bakerview Road, Bellingham, WA 98226.

Q. What is the subject of your testimony?

A. My testimony will address two topics. First is my background and experience related to wastewater treatment. Second will be a discussion of the wastewater treatment...
system at the Cherry Point Refinery and the anticipated impact of discharge from the proposed BP Cherry Point Cogeneration facility.

Q. **What is your occupation and title?**

A. I am an Environmental Engineer with Anvil Corporation providing consulting services in wastewater treatment.

Q. **Please describe your background/education and experience.**

A. I have attached a current copy of my resume as Exhibit 26.1 (WPM-1). My background is as follows. I have BS-Civil Engineering and MS-Civil Engineering from the University of Wisconsin-Madison. I also have a PhD-Civil and Mineral Engineering from the University of Minnesota-Minneapolis. In both the Masters and PhD programs, my major field of study was Environmental Engineering.

I became a Registered Professional Engineer in the State of Wisconsin in 1973 and maintained the registration there. Most states, like Washington, recognize a P.E. obtained in another State. During the 1970s while I was actively involved in managing wastewater treatment systems, I became a certified wastewater treatment plant operator in the State of Minnesota.

I began my career in the 1970s as a project engineer and process control engineer in the operation of industrial and municipal wastewater treatment systems. In the 1980s and 1990s, I worked for ARCO. In 1983-84, I was a start-up engineer on a water treatment plant at Prudhoe Bay, AK. In 1985 and through my retirement in 2000, I
worked at the ARCO Products Tech Center in Anaheim, CA as the in-house consultant for the ARCO West Coast refineries, specifically related to their wastewater treatment systems.

After retirement, I was employed by the Cherry Point Refinery for 2 years as project engineer in their Environmental department. During this time period of 1986 through 2002, I assisted the Cherry Point Refinery with NPDES permit renewals, process design engineering for the 1990s wastewater treatment plant (WWTP) expansions, wastewater treatment process evaluations and control, and wastewater treatment classes for the Refinery’s operators.

Q. What is your role in connection with the BP Cherry Point Cogeneration project?

A. I was retained to evaluate the process wastewater plan for the BP Cherry Point Cogeneration project and the WDOE’s Draft State Waste Discharge permit. In the course of these analyses, I evaluated the impact of Cogeneration wastewater streams on the Refinery’s WWTP and on the ability to meet the Refinery’s NPDES permit.

Q. What information about the BP Cogeneration project have you reviewed?

A. I have reviewed portions of the BP Cherry Point Cogeneration Project Application for Site Certification pertaining to wastewater, including section 3.3 and Appendix F, and particularly the ‘Wastewater Flows and Chemical Composition’ table (Table 3.3-3 of the Application) for the process wastewater streams from the BP Cherry Point Cogeneration project. I reviewed the Draft State Waste Discharge Permit. I
have also participated in conference calls and meetings on these issues, including meetings and calls with the Washington State Department of Ecology (WDOE), and with other BP consultants and personnel addressing Cogen wastewater plans. In reviewing this information, I have relied on over 25 years of experience in wastewater treatment.

Q. What wastewater will be generated by the Cogen facility?
A. There are three primary wastewater streams from the BP Cogeneration facility. The major process wastewater categories are (1) Demin Plant regeneration water, (2) equipment drain and washdown oily wastewater and (3) Cooling Tower blowdown. The expected flow rates and chemical composition of these streams are listed in Table 3.3-3 of the project’s Application for Site certification, a copy of which is attached to my testimony as Exhibit 26.2 (WPM-2).

Q. How would you characterize this wastewater?
A. The wastewater from the Cogeneration project is comprised primarily of cooling tower blowdown and Demin Plant Regeneration water. These are not typical industrial wastewaters in that these streams have not been included in processes exposing them to a multitude of chemicals. The cooling water, which makes up the majority of the Cogen wastewater, does not contact any process in the Cogeneration that could contaminate it, and the only chemicals added to the cooling water are a relatively small amount of corrosion inhibitors. The only other substances in the water are those that existed when the water was delivered to the Cogen project,
primarily dissolved inorganic minerals. These minerals are concentrated when the cooling water evaporates, but their mass is not increased.

Table 3.3-3 of the Application lists the expected contaminant concentrations in the Cogen wastewater streams. They are determined by analytical tests that classify and measure contaminants into certain general categories. Examples of these tests are BOD and COD tests that measure the oxygen demand of the water’s contaminants, a suspended solids test that measures the water’s filterable solids greater than 0.45 micron in size, and the Oil & Grease test that measures the hexane extractable contaminants in water. There are other analytical tests that measure specific contaminant concentrations. These would include a wastewater’s commonly present cations and anions and the trace amounts of specific metals. The items listed under ‘General Parameters’ are often the major contaminants of concern. The levels of BOD, COD, TSS and Oil & Grease expected for the Cogeneration project are much lower than the current influent concentrations to the Refinery wastewater treatment plant (as determined in the 2000-2001 Treatment Efficiency Study). The expected concentrations in the Cogeneration wastewater streams for dissolved solids, major cations, major anions and trace metals will be near or below current Refinery wastewater influent concentrations (per the 2000-2001 Treatment Efficiency Study). Table 3.3-4 of the Application, which is attached to my testimony as Exhibit 26.3 (WPM-3), reflects the Cogen Project’s contribution to the Refinery wastewater stream.
Q. **How will the wastewater from the project be disposed of?**

A. The process wastewater from the BP Cherry Point Cogen project will be disposed of as a discharge to the Refinery’s WWTP. The Cogen’s process wastewaters, cooling tower blowdown, Demin Plant regeneration water and equipment drain and washdown oily wastewater will be funneled to and commingled in an equalization tank at the Cogeneration facility. The equalization tank wastewater will be pumped to the Refinery’s oil water sewer system where it will mix with the Refinery’s untreated process wastewater. The total estimated flow from the Cogen project is 190 gpm. It will combine with and be diluted by the approximately 2,000 gpm dry-weather wastewater flow from the Refinery. The Cogen and Refinery effluent will flow together under gravity influence to the Refinery’s wastewater treatment plant.

The Refinery’s WWTP consists of three major areas: (1) primary treatment in oil/water separators and equalization tanks, (2) secondary biological treatment in a two step process of aerobic biological oxidation in an aeration tank and of biosolids separation (and recycle) in a clarifier tank and (3) tertiary treatment in clarification ponds. The effluent from the Refinery’s WWTP is pumped to the Straits of Georgia as discharge permitted under the Clean Water Act’s NPDES program.

Q. **Can you explain in more detail how the Refinery’s wastewater treatment system works?**

A. Yes, as I said, the Refinery’s WWTP consists of three major areas: (1) primary treatment in oil/water separators and equalization tanks, (2) secondary biological
treatment in a clarifier tank and (3) tertiary treatment in clarification ponds. For each area, I will describe the concept of the wastewater treatment system and then provide some specifics on Cherry Point’s WWTP. Before doing so, a brief discussion of the flow regime of the Refinery’s wastewater through the WWTP is worthwhile. The untreated Refinery wastewater and the Cogeneration project wastewater is collected by the Oily Water Sewers and flows by gravity into the oil/water separators. After floating oil and settleable solids separation in the Separators, the effluent water is normally pumped to the Refinery’s equalization tank. From this tank, flow rate is regulated and flows by gravity though the secondary biological treatment system and then on to the tertiary treatment in the clarification ponds. Finally, the final effluent is pumped from the last pond to the outfall diffuser beneath the dock.

**Primary Treatment:**

An oil/water separator is a liquid/liquid separation device for immiscible fluids that have a specific gravity difference. The Refinery’s WWTP has four oil/water separators each with a liquid volume of ~0.26 MG and a surface area of 4600 sq. ft. In a gravity-induced separation process, oil droplets of sufficient size that have a rising velocity rate greater than the rise rate of the water will accumulate at the surface and be skimmed. The skimmed oil is routed to wastewater tanks. Time and heating are employed to provide an enriched oil phase that is recycled to the Refinery. Excess water is returned to the separators. Sludge from the separators is pumped to second stage separators. The sludge solids are allowed to resettle (and accumulate over time) while the decant liquid is returned to initial oil-water separators.
The effluent from the separators flows into a sump. The effluent from the sump is directed to an equalization tank. The equalization tank mixes the effluent, and skims any remaining oil that accumulates on the underside of the internal floating roof.

**Biological Treatment:**

Aerobic biological wastewater treatment is the process by which microorganisms use the wastewater’s organic component as a food source, in the presence of oxygen, to produce cell growth and the end products of carbon dioxide and water. The Activated Sludge Process (ASP) is a continuous-flow, aerobic biological process for the treatment of biodegradable wastewater. The ASP is characterized by the suspension of microorganisms. These are maintained in a relatively homogenous state with the wastewater by the mixing induced by the aeration system. The purpose for this biological oxidation process is to reduce the wastewater oxygen demand content. In doing so, the eventual release of wastewater into the Straits of Georgia will not cause a dissolved oxygen depletion in the receiving water. The resulting clarified effluent is usually high quality.

**Tertiary Treatment**

The use of ponds after secondary biological treatment (hence the use of the word ‘tertiary’) is to further ‘stabilize’ the wastewater. These ponds are referred to as “clarification ponds” or “stabilization ponds.” The purpose for ponds at Cherry Point has been as a system to improve the quality and to ensure that the biological
system’s effluent meets the NPDES limitations. In a general manner, the removal of suspended solids is accomplished by slowing down the wastewater velocity. In this way, suspended solids are given additional time to settle out from the water.

Cherry Point’s WWTP employs two clarification ponds arranged in series to allow clarifier effluent to flow through both units. The effluent from the second pond passes into a final holding pond (FHP) where it can be commingled with water released periodically from the Storm Water Pond.

**Discharge**

The wastewater effluent is discharged to the Straits of Georgia through an effluent diffuser pipe. The diffuser pipe is located beneath the southern section of the Refinery’s dock (> ¼ mile offshore) and discharges the wastewater effluent into approximately 60 feet of water depth. The diffuser pipe is 52 feet long and has thirteen 4-inch diameter holes that are spaced 4 feet apart. The design of the diffuser helps to ensure a minimal impact of the effluent on the immediate receiving water area. The discharge is subject to NPDES permit no. 002290-0, which requires daily testing of the effluent and quarterly acute bioassay testing. During this permit period, studies such as chronic toxicity testing of the final effluent and receiving water sediment were also required.

**Q.** Will the addition of Cogen wastewater require any change in the Refinery’s wastewater discharge permit limits?

**A.** No. In the State of Washington, effluent limitations for an industrial facility are a combination of technology-based considerations and receiving water criteria. The
Cogen project will not alter the technology underlying the Refinery’s NPDES permit limits so there should be no change in the Refinery’s NPDES permit based on technology considerations. Water quality criteria consider the presence of toxics in a permittee’s discharge. The State of Washington has determined that, based on the composition of the Refinery’s discharge and applicable permitted dilution factors, water quality effluent limits are not required for Cherry Point Refinery’s wastewater discharge. Analyses for the Cogeneration project indicate that the combined Refinery and Cogen wastewater streams after treatment in the WWTP will yield an effluent that should not have the potential to exceed State of WA receiving water criteria for toxics. Therefore, no additions or changes to the Refinery’s NPDES discharge permit will be necessary due to considerations of the State’s receiving water criteria. In sum, there are no factors mandating change in the Refinery’s NPDES permit limits to accommodate the Cogen’s wastewater discharge as well.

Q. Will the Cogen’s wastewater significantly impact the quality of the wastewater outfall from the Refinery treatment system in any way?

A. No. As demonstrated in Table 3.3-3, the chemical composition of the Cogen wastewater will not be high. Once this wastewater has been mixed with the Refinery influent and processed through the Refinery’s wastewater treatment system, it will lead to only very slight estimated increases in certain pollutants discharged to the receiving water. Further, when the pollutants reach the edge of the Refinery’s permitted mixing zone, the added amounts of pollutants due to the Cogeneration process will be inconsequential. In no instance it is believed that this minor increase in pollutants will impact the Refinery’s capability to meet its current NPDES permit
limitations or have an impact of any significance on the quality of the final effluent. There should be no adverse impact on the receiving water due to addition of Cogen’s wastewater to the Refinery’s WWTP. The direct testimony of Michael Kyte addresses impacts of the Cogen’s wastewater on the marine environment.

Q. Will Cogen’s wastewater increase the temperature of the outfall from the Refinery’s treatment system?

A. No, it will not. The commingled Cogen process wastewater streams are expected to have a temperature under 100°F. The Refinery’s influent process wastewater temperature is above 100°F. Therefore, Cogen process wastewater will not increase the overall temperature of the influent stream to the Refinery’s WWTP and in fact may decrease slightly the combined influent wastewater. It should also be noted that the combined wastewater streams will remain and cool in the Refinery’s WWTP for approximately six days. Depending on the season of the year, the temperature of the Refinery’s wastewater discharged to the outfall will be between 60°F and 85°F.

END OF TESTIMONY