BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 96-1

OLYMPIC PIPE LINE COMPANY:
CROSS CASCADE PIPELINE PROJECT

EXHIBIT _____ ( )

REBUTTAL TESTIMONY OF GARY PIERMATTEI

ISSUE: FIRE AND EXPLOSION RISKS

SPONSOR: OLYMPIC PIPE LINE COMPANY

Q. Please state your name, business address, and employment position.

A. My name is Gary Piermattei. I am a Consulting Engineer for Rolf Jensen and Associates, Inc. My business address is 2125 Oak Grove Road, Suite 300 Walnut Creek, CA 94598-2539.

Q. What is the subject matter of your testimony?

A. Fire and Explosion Risks.

Q. Summarize your professional qualifications, and education.

A. I am a Registered Fire Protection Engineer (California Certificate # FP 1239) and a Registered Mechanical Engineer (California Certificate # 17527 and Alaska Certificate # ME-4803). I am a member of the Society of Fire Protection Engineers, the National Fire Protection Association, and the American Society of Mechanical Engineers.

Q. Can you summarize your relevant professional experience?

A. My professional background covers over 25 years of diverse engineering applications and design experience, including in the marine and petroleum industries, with particular emphasis on fire protection. I have designed and managed a wide range of fire protection projects in the petroleum and marine industries, including an oil tanker marine loading terminal, fuel tank farm storage facilities, numerous drilling ships and mobile drilling units and two fire fighting vessels for the North Sea, a retrofit deluge system for a large offshore production platform, a permanently moored oil storage tanker, a cargo wharf, and two gasoline terminal loading racks. My work in fire detection and alarm has included smoke, heat, and flame detection, multiplex and hard-wired alarm systems. My work in suppression systems design has included low and

high expansion foam systems, wet and dry pipe sprinklers, deluge systems, halon, and carbon dioxide. I have worked on projects in the U.S., Korea, Canada, New Zealand, Australia, and Britain.

Q. What is Fire Protection Engineering?

A. Fire protection engineering is the study of a systematic approach to fire safety and involves six major areas of study: prevention of ignition, design to slow fire growth, detection and alarm, suppression, confinement and evacuation.

Q. To which prefiled testimony are you responding?

A. Primarily, I am responding to the pre-filed testimony of Dr. John P. Wagner, though some of Dr. Wagner's concerns are echoed in the report of Shapiro & Associates, attached as Exhibit 3 to the prefiled testimony of Mark G. Pedersen.

Q. What materials have you reviewed in preparing your testimony?

A. I have reviewed portions of Olympic Pipe Line Company's Application for Site Certification, the Draft Environmental Impact Statement, the pre-filed testimony of Dr. John P. Wagner and Mark G. Pedersen, and additional information concerning the Snoqualmie tunnel & Kittitas Terminal supplied by Olympic Pipe Line Company. I have had discussions with Olympic Pipe Line Company representatives. And I have also relied on reference sources, such as the Uniform Fire Code, NFPA standards, and other individuals within Rolf Jensen & Associates.

Q. Can you summarize your overall impressions of the proposed pipeline from a fire protection perspective?

A. My overall impression is that the proposal to use a pipeline to transport fuel from western to eastern Washington is an improvement in the level of fire and life safety. The California State Fire Marshal's characterization of the different means of transport, with pipelines having the safest record, casts a positive light on the project. I believe this safety record is largely due to a greater degree of control that is available for a buried pipeline than the other forms of transport.

Q. Can you summarize your reaction to Dr. Wagner's testimony?

A. Dr. Wagner's discussion involving mathematical calculations of various hypothetical scenarios leaves the reader with an appreciation of the large amount of energy stored in gasoline and the ease with which it can be ignited. This is appropriate, as many do not recognize the hazard present in many of our common hydrocarbon fuels. Our handling of gasoline at self-service gas stations might lead individuals to become complacent about the relative hazards involved. The calculations presented involved assumptions that may not necessarily represent the physical conditions associated with a pipeline leak or spill that might occur. Dr. Wagner's statements seem to indicate that these were just assumptions, and not necessarily based upon calculations or data. An example is the statement, "if a 100 gallon spill were to vaporize at a given point". The effects described by Dr. Wagner are the types of risks that are theoretically present whenever gasoline is transported, whether by pipeline, truck, or barge, with no comparison of actual risks attendant to each type of transportation. A gasoline truck passing near a high school or a grade school poses a similar hazard. The magnitude of the event may be smaller, but the probability of a mishap is much higher.

Q. Can you respond to Dr. Wagner's analysis of the explosive hazards associated with petroleum products?

A. The calculations in his testimony concerning the amount of explosive force make assumptions regarding the amount of vaporized gasoline. It would be useful to review statistical data regarding the history of tank farm fires to see the likelihood of these leaks and the types of explosions and fires that result.

Q. Can you respond to Dr. Wagner's statements about flammable vapor?

A. The analyses presented in his testimony assumes leaks of gasoline products of 100 gallons, 1,000 gallons, or 10,000 gallons that will completely vaporize and then explode causing a calculated area of damage. Under typical conditions surrounding the terminal or pipeline, it would likely take a dramatically larger leak or spill to approach the conditions causing the size of vapor clouds calculated. Though gasoline and similar products do evaporate over time when exposed to air, the ability of a flammable vapor cloud to form from such evaporation depends on weather conditions present at the point of the leak. Wind will act to move and dilute the vapor cloud forming. While wind transports the cloud toward potential ignition sites it also dilutes the concentration as it transports, eventually reducing the concentration to levels too low to support combustion or explosion.

Q. How does Dr. Wagner's discussion relate to overall safety of the pipeline?

A. It is appropriate to review the pipeline proposal by comparing it to the present methods of transport used, tanker truck and barge. While the pipeline has the potential for a much larger spill than a tanker truck it also is buried underground for nearly its entire length, making it much less susceptible to damage. A tanker truck is subject to all of the potential sources for

uncontrollable problems associated with our roadways. These include automobile accidents and train accidents as well as being located in areas where people are likely to be at risk, namely on or near the roadway.

Q. Can you comment on Dr. Wagner's discussion regarding possible sources of ignition?

A. Dr. Wagner's examples of ignition sources focus on methods that could ignite a flammable vapor cloud under the right conditions. It is appropriate to discuss the flammable nature of gasoline, as many handle it daily without concern and don't have an appreciation of the hazard involved. Gasoline has a relatively narrow range of air-vapor mixtures that will allow combustion. It also has a relatively high auto ignition temperature. That is one reason vapor explosions do not happen routinely at self-serve gas stations, and that is also part of the reason overfilling an automobile gas tank does not usually cause a fire or explosion. Dr. Wagner's testimony does not attempt to explain or analyze how the proper mixture could arise from a given leak or spill somewhere along the length of the pipeline. One of the advantages of the pipeline is that most of its length is in areas without any nearby sources of ignition. This is not true for the gasoline tanker truck, which may be surrounded by potential sources of ignition. Barge transportation has a number of perils including concerns regarding water pollution and the risks involved when making and breaking hose connections.

Q. How do you respond to Dr. Wagner's testimony regarding the pipeline's proximity to buildings and schools.

A. Dr. Wagner's concern regarding the proximity of the pipeline to the schools is appropriate. While the probability of a leak at this exact location is quite low, it is appropriate to review the pipeline's specific location. Will a leak drain towards or away from the schools? What

portion of the school is near the pipeline? The edge of the soccer field poses a totally different exposure than the kindergarten classroom. What is located between the pipeline and the school? The presence of a hill might significantly reduce the hazard posed by the pipeline while an open field would not. These issues should be addressed and reviewed. Again, we must keep in mind that the hazard posed by the tanker truck loaded with gasoline also poses a hazard to schools. There is very little we can do to protect the school from a truck driver suffering a momentary loss of control. Examples of such an event would be an automobile accident or a heart-attack. The pipeline may pose a more manageable risk. There may be precautions that can be taken to make a hazardous situation extremely unlikely. This could simply involve some grading of the soil nearby the pipeline. It is appropriate and necessary to scrutinize the proximity of buildings and schools to the pipeline and ensure that all applicable code requirements, including National Fire Prevention Association ("NFPA") standards and the Fire Code are fully satisfied before operating the pipeline.

Q. What are the NFPA standards, and can you respond to the suggestion in Dr. Wagner's report that they are biased against safety concerns?

A. The application reflects Olympic Pipe Line's intent to design, construct, and operate the pipeline in accordance with the latest versions of applicable codes, regulations, and consensus standards. Dr. Wagner's statements regarding the NFPA standards deserve comment. The NFPA standards are developed in accordance with the American National Standards Institutes requirements for a consensus standard. While it is true that industry representatives who may have a vested interest influence the committee, it is not true that they all have an interest in minimal levels of safety. Some of the committee members represent concerns related to insurance, engineering, safety and fire protection equipment manufacturing. These members

may have vested interests in pursuing high levels of safety. Higher levels of safety generally benefit insurance carriers, engineering firms, safety concerns and fire protection equipment manufacturers. Having participated in NFPA committees I understand the concern expressed that the consumer/citizen may not be well represented. However, it is my experience that the system works well in spite of this deficiency due to the competing interests represented on the committees. It is also appropriate to mention that the Uniform Fire Code is developed jointly by the Western Fire Chiefs Association and the International Conference of Building Officials. Neither of these organizations have a vested interest in minimizing the level of safety. Participation on these committees is generally limited to the fire service and building code officials. These organizations frequently rely on NFPA standards.

Q. What can be done to address the potential risks identified by Dr. Wagner that are associated with the Snoqualmie tunnel?

A. I have discussed the tunnel arrangement with Olympic Pipe Line Company representatives and now understand that the pipeline was originally proposed to be installed inside a concrete structure above grade. Due to concerns of the Washington Department of Parks and Recreation, the pipeline was relocated into a trench to avoid any visual concerns. Olympic Pipe Line Company agreed to the relocation as it saw a number of advantages to locating the pipeline in a buried trench; these include better protection from damage and the ability to use cathodic protection to minimize pipeline corrosion concerns. Generally, pipelines have their greatest exposure to leaks wherever there are appurtenances, such as valves, flanges, and fittings. The pipeline in and around the tunnel will be buried welded pipe without any connections, flanges, or valves. Based on discussions with the Olympic Pipe Line Company, the line in the tunnel is at the highest elevation of the pipeline. This high elevation of the tunnel

piping and the SCADA system should limit the size of a large spill. Although the likelihood of a spill inside the tunnel is extremely low, it is nevertheless appropriate to review the proposed tunnel arrangement and its compliance with applicable codes. Measures to minimize the possibility of a leak, avoid sources of ignition, and detect leaks should be considered. The arrangement should follow the Fire Code, NFPA standards, and utilize listed equipment suitable for the location.

Q. What about the safety concerns regarding the proposed Kittitas terminal?

A. The disaster scenarios reviewed in Dr. Wagner's report represent hypothetical worst case scenarios, containing many unexplained assumptions that extremely unlikely preconditions will occur (*e.g.*, the complete failure of all fire suppression and mitigation measures). Even if one of these scenarios occurred, injuries and damage would be contained due to the siting of the terminal far away from inhabited areas. Furthermore, the mitigation measures proposed by Olympic, including the use of covered floating roof tanks combined with the Aqueous Film Forming Foam (AFFF) suppression technology, limits the exposure of air to the stored gasoline and inhibits the spread of fire or the potential of explosion. The experience with floating roof tanks and AFFF suppression technology has been quite positive.

OPL reports that, in addition to a 100,000 gallon water tank on site, a 500 gallon per minute well is planned and that a connection to the water main in the road, rated at 1600 gallons per minute, is being investigated. The viability of these sources of water needs to be confirmed. The water tank should be sized to provide a sufficient quantity for fire fighting needs. I believe that a detailed review of these needs will show that a larger tank may be required, and OPL has expressed its commitment to incorporate into its design of the terminal any such measures that may be required to ensure fire safety. Likewise, OPL plans to have a

significant surplus of AFFF concentrate stored on site, well in excess of the code required amounts (two or three times the required amount).

Q. Will the terminal have enough personnel to control a fire event?

A. Qualified operational personnel with appropriate training and operating code complying systems are sufficient to minimize the risks described by Dr. Wagner. In addition, OPL has been consulting directly with fire protection agencies along the pipeline route, including Kittitas County. In addition to agreeing to provide training to Kittitas fire department personnel, OPL has committed to donate a portion of the terminal property to Kittitas Fire District No. 2 to build a new station at the terminal site. If built, an on-site fire station would certainly be a positive factor from a fire safety perspective.

Typically, one prepares calculations such as those listed in Dr. Wagner's report when dealing with an exposure where there are no codes or standards in effect. The Fire Code and the NFPA standards have been developed over many decades and represent the efforts of numerous experts reviewing a long loss history and include the testing of equipment by nationally recognized laboratories. Generally, we find that losses are due to failures in meeting the code, not in shortcomings of the code. I suggest that safety is best served by working diligently to assure compliance with nationally recognized standards. This includes making sure that the design arrangement meets the standards, that it is constructed properly, that testing shows its proper operation and that it is maintained properly. This also includes ongoing training for operating personnel. This is no small task, as it requires discipline and vigilance. The code is set up to take numerous lines of defense, any one of which will succeed in breaking the chain of events leading to a fire or explosion. These precautions include preventing ignition sources, preventing uncontrolled release of vapors, limiting the size of a spill, and providing

agents such as AFFF to cover any spill. Following the code requires discipline and vigilance. It also requires a constant dedication to quality assurance. I suggest that the best way to promote safety is to maintain compliance with these standards. This should include a detailed plan which should be developed in the next stage of design and which should identify all the applicable codes, how they will be applied and how proper operations will be maintained throughout the life of the pipeline.

Q. Can you comment on the videotape submitted by Dr. Wagner?

A. The videotape shows the tremendous amount of energy stored in hydrocarbon fuels and the danger associated with its uncontrolled release. The tape shows disasters associated with pipelines and tank farms but does not show any disasters related to gasoline tank vehicles or barges. Tank vehicles and barges are presently being used to transport the fuel and will continue to be used if the pipeline is not installed. These modes of transport are reported by the California State Fire Marshal as being more hazardous based on life loss history data. A videotape of disasters related to tanker trucks has been prepared by others and included with this testimony.

Q. What are some of the risk factors associated with transportation of petroleum products by these other modes?

A. One of the many of the exposures related to tank vehicles is the lack of control over road conditions. There is no effective way of controlling nearby drivers and road conditions for these gasoline tank vehicles. One only has to imagine the risks involved when considering a tanker truck with chains on, going over an icy mountain pass. One tanker truck can carry up to 11,000 gallons of gasoline. Following the theoretical calculations in Dr. Wagner's testimony,

these vehicles pose an incredible hazard on our highways. While there are numerous regulations on these vehicles, the loss history has been poor compared to that of pipelines.

Q. Can you summarize your testimony and views regarding this project.

A. As with any evaluation of safety, it is always relative to another alternative. The proposed pipeline offers the opportunity to pursue a safer method of transport. Diligent use of the existing codes and standards to properly design the system and vigilant maintenance of the system and safe operations is the key to maximizing the improvement in fire and life safety.

END OF REBUTTAL TESTIMONY

I declare under penalty of perjury that the above testimony is true and correct to the best of my knowledge. Executed this 24th day of March, 1999.

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Gary Piermattei, P.E.