BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of Application No. 96-1

Olympic Pipe Line Company

Cross Cascade Pipeline Project

PRE-FILED TESTIMONY OF CHARLES H. BATTEN

ISSUE:

ENGINEERING ANALYSIS OF PROJECT'S SAFETY AND RISK MITIGATION FEATURES

SPONSOR:

City of North Bend, Washington
City of Snoqualmie, Washington
Cascade Columbia Alliance

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Would you please identify yourself?

My name is Charles Batten. I am President of Batten & Associates, Inc. My company provides safety consulting services for liquid and gas pipeline systems and hazardous materials transportation. These services include design, construction, operation, and maintenance of these systems. I am skilled in performing regulatory compliance audits, risk management analyses, engineering and research, training, and accident investigation. My services are available to the transportation industries, government agencies, and the public.

Would you please summarize your experience and education relevant to your work?

I have more than 35 years of engineering and management experience in pipeline transportation and hazardous materials safety in both private industry and government (state and federal). I currently serve on the Gas Pipeline Technology Committee and have served on numerous national committees (e.g., National Academy of Sciences; American National Standards Institute (ANSI)). I have testified before the United States Congress, worked with Congressional Committees on developing legislation affecting transportation systems, and authored and presented technical papers before industry, government, and public audiences. I am sponsored by the Institute of Gas Technology to conduct for the pipeline industry both accident investigation and risk management seminars.

For 23 years, I was employed by the National Transportation Safety Board (NTSB) where I performed investigations of pipeline and hazardous materials (rail, pipeline, highway, marine, and aviation) transportation accidents, conducted special investigations of technical safety issues, and participated in and reported on studies of national transportation safety issues. I have addressed regulatory compliance, accident causes, and prevention strategies for more than 300 accidents.

I hold a Master of Science in Safety from the University of Southern California, and a Bachelor of Civil Engineering from the George Institute of Technology. I have specialized education on Risk Management from Texas A&M University. I am a registered Professional Engineer in California both in Corrosion and Safety.

My resume, including a list of major investigations and studies is attached as Exhibit CHB-1.

What assignment were you given with regard to the Cross-Cascade Pipeline proposal?

I was asked to evaluate certain sections of the Revised Application, particularly §§ 2.3 (Construction On-Site) and 2.9 (Spill Prevention and Control). I also evaluated § 3.18 of the Draft EIS (Health and Safety). I am appending this section of the Draft EIS as Exhibit CHB-2. I assessed these documents for the adequacy of the information provided.

I also was asked to assess the risks associated with hazardous liquid pipelines generally, but more particularly the degree to which the design of Olympic's proposed pipeline reduces those risks. I also was asked to assess the degree to which risks associated with hazardous liquid pipelines are reduced by adherence to existing state and federal regulations.

What have you reviewed in relation to this assignment?

In addition to reviewing the documents described above, I also had available the entire Revised Application. I reviewed other sections of the application as necessary to make certain I understood the sections I was principally reviewing. I also drew on my extensive library of reports, textbooks, and other documents pertaining to these issues. And, of course, I drew on my own personal experience having worked with many in the transportation industries and having investigated personally many accidents. I reviewed specification brochures of companies that develop pipeline leak detection systems, including the brochure of Modisette Associates, Inc., and technical papers on the performance of leak detection systems. I reviewed the requirements of federal regulations (49 C.F.R. 192 and 49 C.F.R. 195) and the Office of Pipeline Safety liquid pipeline accident data base.

What conclusions did you reach regarding the adequacy of the information contained in the Application?

On the issue of comparing the risk of pipeline transportation with other transportation modes, the Application contains inadequate and, at times, misleading information. For instance, the Application asserts: "Pipelines [are] Rated Safest of Transportation Methods." Application at S-7. The applicant has not adequately documented this statement. Data reported to the Federal Office of Pipeline Safety (OPS) since 1970 shows that an average of 225 liquid pipeline accidents occur each year with an annual average of four fatalities, $25,000,000 in property damages, and release of more than 10,000,000 gallons of product. To be comparable with the loss of product from pipelines, there would have to be a total release of products transported from about 1,343 tank trucks each year. Olympic has not shown that it would be safer to transport product by pipeline as it relates

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

to the release of product into the environment. The California Fire Marshall's Report referenced by Olympic did not address this issue.

Does the Draft EIS cure these deficiencies?

No.

Worse yet, the DEIS contains additional flaws of its own. For instance, in comparing pipelines versus river barge transportation, the DEIS fails to take into account the beneficial effect of double hulled river barges (currently, 65 percent of the Columbia River shipments are on doubled hulled barges and this figure is required by federal law to be 100 percent by 2015).

The DEIS comparative analysis also errs in relying on OPS data which is not appropriately used for this purpose. For instance, the OPS database generally does not include releases smaller than 50 barrels (2,200 gallons). Yet, the DEIS compares this database with data from other transportation industries (barging, trucking) where the data generally does include releases smaller than 2,200 gallons. Additional problems with the OPS database are discussed in my accompanying report. Exhibit CHB-3.

What were you able to determine regarding Olympic's proposed leak detection system?

Olympic claims its leak detection system is "state-of-the-art." However, the application contains no information in support of that claim and the information it provided on the Modisette Associates, Inc. leak detection system (OPL 000001-000030) does not provide any information in support of that claim. Nowhere does the Modisette information state any claim for a specific leak rate detection capability. Nor does that information provide specifics as to the system reliability or repeatability or accuracy of leak location identification. The information only provides general characteristics and operational information without giving any criteria on which to base an evaluation as to the adequacy of the system.

In contrast to the proposed system, there are several other available leak detection system developers who detail their system capabilities and limitations -- some claim leak detection capabilities of 0.1 percent of the pipeline flow rate within minutes after a leak develops and claim the capability of identifying the leak location to within 1,000 feet.

Additionally, there are several leak detection systems available which are more sensitive than a SCADA subsystem. Hydrocarbon sensing cables, clamp-on flow meters, acoustic sensors, pressure point and mass volume balancing are additional

leak detection methods used by others in the industry which are more sensitive and provide information about leaks sooner than a SCADA subsystem.

What are hydrocarbon sensing cables?

Hydrocarbon sensing cables are cables buried adjacent to and slightly below the pipe. The cable outer covering is impervious to water but will allow hydrocarbon vapors to pass through. Continuous monitoring of the cables is performed by pulling air through the cable into a hydrocarbon detector. Systems are available to detect hydrocarbon levels as low as 0.2 percent hydrocarbon vapor in air and are able to identify the source of hydrocarbon within about 5 feet. The Williams Pipeline Company (one of the largest pipeline companies in the country) is now using this type of leak detection system where its pipeline crosses a large aquifer.

What are clamp-on flow meters?

Clamp-on flow meter leak detection systems are capable of being one of the fastest available detector systems for small leaks and catastrophic ruptures. These systems consist of a master station that polls the clamp-on flow meters periodically and then performs volume/balance computations. A clamp-on meter leak detection system is now being used by Cal-Nev for its hazardous liquid pipeline that crosses the mountain ranges between San Bernardino, California and Las Vegas, Nevada.

What are acoustic sensors?

Real time monitoring of pipeline systems using acoustic leak detection systems can provide prompt detection of leaks and ruptures, usually within one minute, and identify the location of the release within about 500 feet. Fluid escaping from a hole in the pipeline will produce a sudden pressure loss in the pipeline which propagates in both directions as acoustical signals. Acoustical signals propagate with the speed of sound in the fluid and over long distances in the pipeline due to the low signal absorption and because the pipe wall guide the wave fronts. These signals can be detected and analyzed to identify both the existence of and approximate location of leaks.

What are pressure point and mass volume balancing leak detection systems?

A pressure point and mass volume balancing leak detection system is based on the detection of variations in the pressure and density profiles in the pipeline when a leak or rupture occurs. Analysis of variations in these parameters allows identification both of the existence of a leak and its approximate location. While sensors can be employed simply at each end of a pipeline, sensitivity and timeliness of detection is increased significantly by increasing the number of sensing locations along the pipeline. This type of system can detect losses as low

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

as 0.1 percent of pipeline flow. This type of system has been required by the New York State Fire Marshall for years for that portion of the Buckeye Pipeline that crosses New York State.

Does Olympic's Revised Application accurately and forthrightly describe the capabilities of the SCADA subsystem leak detection system?

No, it does not. First, as already noted, no technical information has been provided by the applicant sufficient to assess the leak detection system's capabilities.

Second, the Revised Application never acknowledges that slow leaks can go undetected by the SCADA subsystem for weeks, months, or even years.

Third, the Application fails to disclose the amount of hazardous liquid product that can leak from the pipeline when there is a slow leak below detection limits. For instance, if you accept the Revised Application's suggestion that the SCADA subsystem can detect leaks as low as one percent of flow, then flows less than one percent of flow (3,150 gallons per hour of product) may leak from the pipeline and go undetected for unknown time intervals (hours, days, weeks, or months) and may go unrecognized by the system controllers as input/output imbalances due to meter or other equipment errors.

This is the equivalent of an 8,000 tank truck spilling its entire content every three hours without being detected for days, weeks, months, or years.

Based on your review of the Revised Application, is Olympic proposing to use "state-of-the-art" methods for testing for small leaks from its Cross Cascade Pipeline?

No. There are several superior testing methods not proposed by Olympic.

One particularly useful test is the "shut-in" test. Shut-in tests are performed while the pipeline is not flowing, remote block valves are closed, and the system is under pressure. During the time the calibration of pressure and temperature devices on the pipeline are verified and then using a shut-in leak test computer program, the pipeline is continuously monitored to determine pressure and temperature variations that are used to evaluate if leaks exist. Shut-in tests should be able to detect small leak rates, such as 200 to 300 gallons of product during a 24 hour period. The designers of the Yellowstone Pipeline, apparently acknowledging the inability of the SCADA subsystem to detect small but environmentally important leaks, plan to conduct shut-in leak tests about every ten days. It is estimated that the shut-in leak test will be capable of detecting a five barrel release over a time range of 7.5 minutes to 24 hours.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Olympic proposes to do a one time, pre-operation hydrostatic test of the pipe using minimum DOT regulations. Most natural gas pipeline companies have switched to a more demanding hydrostatic test. Because the pipe design principles and the pipe material are the same in these two industries, petroleum pipelines, like Olympic's, should be tested at this higher standard, too.

Do you propose more than the single pre-operation hydrostatic test?

Additionally, Olympic should perform a pre-operational internal inspection of the pipeline as some pipeline operators have done to provide a base pipe condition report against which to compare future internal inspection results.

Is Olympic proposing to use state-of-the-art methods for internal inspection?

No -- or at least it cannot be determined from the information in the Revised Application.

First, let me explain that there are a variety of tools and methods for running an instrument through a pipe to determine from the inside out whether it is corroded, dented, or suffering other physical defects. In the industry, these devices are known generically as "smart pigs."

Olympic's Revised Application states that it intends to use a "smart pig" but it does not specify what type. There was a wide variety of smart pig technologies on the market. The Revised Application does not specify that Olympic is committed to using one of the more sophisticated, state-of-the-art internal inspection technologies, such as British Petroleum's "smart pig."

Is Olympic using state-of-the-art methods for spill containment, particularly in sensitive areas?

No. Double wall piping should now be considered state-of-the-art. Double wall piping involves placing the petroleum product pipeline inside another protective pipe. This is also sometimes referred to as the "pipe in pipe" method. This method provides at least three advantages: First, the outer pipe provides protection for the inner pipe. Second, if there is a flaw or failure in the inner pipe the product is released into the outer pipe not into the environment. Third, various leak detection devices can be placed in the void space between the inner and outer pipe to allow for a superior leak detection system.

Is Olympic proposing to use state-of-the-art cathodic protection?

No -- or at least it cannot be determined from the Revised Application.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Again, let me begin by explaining what we mean by "cathodic protection." Pipelines buried in the ground are vulnerable to corrosion. There are several systems available for protecting pipelines from corrosion. These systems provide "cathodic protection."

As with the internal inspection equipment mentioned above, there are several different methods for providing cathodic protection. Some work better than others. Olympic has not specified what type of cathodic protection it plans to employ and therefore it is impossible to state that they are proposing to use a state-of-the-art system.

Does Olympic propose to utilize modern pipeline construction techniques?

Olympic's Revised Application states that the pipeline will be completed using the most modern pipe and construction techniques and supports this statement by indicating that it will not utilize acetylene welding. See Revised Application at S-6. Acetylene welding has not been used for joining high pressure pipelines for more than 40 years and certainly no knowledgeable pipeline operator would consider its use today. This is hardly evidence that the pipeline is going to be constructed using "modern" techniques. As detailed in my report, the Revised Application provides little or no useful information to assess Olympic's claim in terms of the "toughness" of the steel, pipe stringing, joint coding, and other important engineering and construction issues. Without such information, it cannot be determined that the pipeline would be built using modern or "state-of-the-art" construction techniques.

What are block valves and is Olympic proposing to use an appropriate number of them?

Block valves are valves in the pipe which can be closed to block the flow of fluid in the pipe. Block valves can be controlled manually or remotely. Block valves can be important in limiting the amount of hazardous liquids that escape from the pipe once a leak has been detected. Block valves do not reduce the risk of a leak but they can reduce the quantity of product released.

The industry standard for block valve placement used to be one at least every 7.5 miles. This industry standard has been withdrawn. The Volpe National Transportation System Center (in conjunction with the Research and Special Programs Administration (RSPA) of the U.S. Department of Transportation (within which is the Office of Pipeline Safety) completed a study in 1995 which addresses this issue. That study concluded that block valves can have a beneficial effect in limiting spill size, particularly with regard to the largest, most catastrophic spills.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Olympic's Revised Application indicates that there will be six segments of more than ten miles without a block valve. The longest section without a block valve is 41 miles. A detailed study of the topography in these stretches would probably reveal that there was a significant benefit to adding block valves in these stretches.

In addition to the block valves proposed by Olympic, in the event that Olympic does not install double-wall pipe at all stream crossings, there should be a block valve installed on each side of streams crossed by the pipeline to provide the ability to isolate those pipe segments and minimize the quantity of product that may flow from an opening in the pipe located within the stream boundaries.

Is Olympic proposing to use "state-of-the-art" techniques in the design and construction of the pump stations and Kittitas terminal facility?

The Revised Application provides no information as to the standards Olympic will use in the design of these facilities. The Revised Application contains no specific information as to the types and numbers of controls and other safety devices at these facilities.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Can't we just assume that Olympic's adherence to state and federal safety regulations will address most or all of these issues?

Not at all. Unfortunately, the federal regulations of refined petroleum product pipelines is almost non-existent. And while Washington State recently was given authority to adopt regulations of its own, the Washington Utility and Transportation Commission merely adopted by reference the sparse federal regulations.

What is your basis for testifying that the federal regulations are "sparse" and "virtually non-existent?"

Well, remember, for years I worked for the National Transportation Safety Board and had direct involvement and responsibility for reviewing the regulations promulgated by the Office of Pipeline Safety. In that capacity, I prepared and reviewed a variety of reports analyzing those regulations. Time and again, the National Transportation Safety Board concluded that the Office of Pipeline Safety was not doing an adequate job of regulating the petroleum pipeline industry.

Can you give me some examples?

As one example, the OPS regulations require that operators have procedures on monitoring pipeline operations (i.e., leak detection system) but the regulations do not include any criteria or guidance on establishing acceptable detection standards either in terms of sensitivity, timeliness of detection, or reliability of operation. The regulations also do not establish standards for how quickly an operator must be able to isolate a failed pipe segment after a leak is detected nor do the regulations specify the maximum volume of product which is allowed between isolation (block) valves.

Another example is in the area of initial construction and subsequent testing. The regulations fail to specify standards for steel "toughness," another important engineering parameter. The regulations make no requirement for periodic pressure tests or internal inspections to confirm the physical integrity of the pipeline to continue operation at the maximum initial operating pressure.

The federal regulations do not specify in detail the design, testing, maintenance, and operation of pump stations and terminal equipment, including storage tank facilities.

These and other regulatory inadequacies leave people and sensitive environments at substantial risk.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Is OPS the federal agency responsible for promulgating pipeline regulations to protect against environmental harm?

It is, but actually that became its responsibility only recently. Not until 1994 was OPS required to consider environmental impacts of pipeline leaks and ruptures in the development of OPS's regulations. But OPS still has not acted to meet the 1994 Congressional deadline to adopt regulations to take into account avoidance and mitigation of environmental impacts.

These shortcomings are discussed in several National Transportation Safety Board (NTSB) reports. For instance, the NTSB has noted that OPS had failed to establish minimum performance standards for prompt detection and rapid isolation of failed pipeline segments.

Attached as Exhibit CHB-4 is an NTSB press release announcing the release of a 1996 study (cited in my report) which determined that OPS "still lacks an adequate system to address corrosion control, inspection, and testing of pipelines, methods to limit the release of product from failed pipelines and analyze operator performance."

Do OPS regulations address siting considerations to provide for protection of people and buildings in the vicinity of a pipeline?

No. OPS has acknowledged that its hazardous liquid pipeline regulations contain no siting standards and that the regulations make no requirement on liquid pipeline operators to provide safety buffers to protect the public or the environment in the event of releases from pipelines.

What is the pipeline industry's record of leaks and ruptures?

Industry records (and Olympic's records) establish that pipelines leak -- probably more often than most people realize. In answering the question though, I must qualify my response by noting that we are totally dependent on self-reporting of leaks and ruptures by the pipeline companies. The federal reporting requirements do not require reports of leaks less than 50 barrels (2,200 gallons). While there is a sprinkling of leaks smaller than 50 barrels included in the OPS database, the database is certainly not complete in this regard.

Further, historically there has been little or no effort by OPS to verify the accuracy of data submitted by the private pipeline companies. Where independent verification has been done, there frequently has been an upward adjustment in the estimated volume of spill material.

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868

Even with these limitations, the database reveals that there are on average 200 spills per year from pipelines in the United States (generally in excess of 50 barrels or more). These spills average 42,000 gallons.

Has Olympic's spill record been better than the industry average?

No. Olympic's record for product releases appears to be typical for the industry. The types of problems it has experienced are typical too, including deficient construction practices, quality control procedures, employee training, operator procedures, system design, and external forces.

Does Olympic's Revised Application include a fair and complete disclosure of Olympic's spill history?

No. Even if we assume that Olympic's spill reports to OPS have been complete and accurate, the Revised Application does not even include a full list of those previously reported spills. Five spills (roughly ten percent of the total) were omitted from the spill history disclosure in the Revised Application.

Do you have recommendations that would improve the information in the Revised Application and/or the project itself?

Yes. I cover these in my report and summarize them at the end of my report. My recommendations could be grouped into two categories. First, the Application needs to be substantially revised. It does not have nearly enough information upon which a rational decision to approve this project could be based.

Second, if approved, the project should be required to incorporate a number of state-of-the-art technologies. Double-walled pipes should be incorporated into the design, particularly in sensitive areas. Better leak detection systems should be employed, such as hydrocarbon sensing cables in environmentally sensitive areas. Shut-in tests using methods adequate to detect a 250 gallon product release should be employed at least every ten days. It should be required that internal inspection of the pipe ("smart pigging") utilize the full capabilities of a state-of-the-art system. Block valves should be spaced a maximum of ten miles apart, closer where conditions warrant.

END OF TESTIMONY OF WITNESS

cca\experts\batten.pft

BRICKLIN & GENDLER, LLP
ATTORNEYS-AT-LAW
SUITE 1015 FOURTH AND PIKE BUILDING
1424 FOURTH AVENUE
SEATTLE, WA 98101
(206) 621-8868