



**National Transportation Safety Board**  
Office of Railroad, Pipeline and Hazardous Materials Investigations  
Human and Survival Factors Division  
Washington, D.C. 20594

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December 5, 2001

**HUMAN PERFORMANCE SPECIALIST REPORT, Revision 1<sup>1</sup>**

**A. ACCIDENT**

**Location:** Bellingham Water Treatment Plant, 3201 Arbor St.  
Bellingham, Washington

**Carrier:** Olympic Pipeline Company

**Date:** June 10, 1999

**Time:** 1624 Pacific Daylight Time

**Number:** DCA-99-MP-008

**B. HUMAN PERFORMANCE SPECIALIST**

No group was formed.

**C. SCOPE OF THE FACTUAL INVESTIGATION**

This report will be limited to the facts concerning the control center and resultant issues affecting controller performance. Personnel in the control center were not available to be interviewed.

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<sup>1</sup> Revised to incorporate additional factual information provided in the following: An October 12, 2001 letter from RSPA; a November 6, 2001 letter from Washington Department of Ecology; and a November 6, 2001 letter from BP Pipelines (North America). The additional information is italicized in this report.

## D. SUMMARY OF THE ACCIDENT

About 3:30 p.m. on June 10, 1999, a 16-inch diameter steel pipeline owned and operated by Olympic Pipe Line Company<sup>2</sup> ruptured and released about one-quarter million gallons of gasoline into a creek that flowed through Whatcom Falls Park in Bellingham, Washington. The gasoline was ignited about 1½ hours after the rupture and a fireball traveled approximately 1½ miles along the stream. Two young boys, both 10 years old, and a young man 18 years old were killed as a result of the accident. Eight additional injuries were documented. A single-family residence and the City of Bellingham's water treatment plant were severely damaged.

### Operational Factors - Overview

The accident section of pipeline ran from a pumping station near Ferndale, Washington, approximately 37.4 miles southward to Olympic's Bayview Products Terminal and Allen pumping and storage station near Allen, Washington. *The pipeline was originally installed in 1965; however, the accident section of pipeline was rerouted in 1966.* The entire pipeline system operated by Olympic Pipeline is remotely operated from a central control center located in Renton, Washington. From this centralized location, operations controllers can monitor key variables (using the Supervisory Control and Data Acquisition, or SCADA, system), such as pressures and flow rate throughout the entire system. The controllers can also monitor and operate mechanical components, such as pumps and motor-operated valves.

On December 16, 1998 (about 6 months before the accident) the Bayview Products Terminal began operating on Olympic's pipeline system. During this period the *receiver inlet valve on the pipeline entering Bayview Products Terminal closed 59 times (or roughly twice per week), and 41 of these closures are believed to have been caused by pressure buildup within the Bayview Products Terminal.* On the day of the accident, pressure began to build at the Bayview Products Terminal as a result of delivery changes underway further down the pipeline system. A relief valve had been previously installed to divert product into a storage tank to reduce the pressure within the facility; however, pressure within the station continued to build, triggering the closure of a block valve on the pipeline coming into the station.

The operations controller (Kevin Dyvig) who was operating the section of pipeline that ruptured has declined to talk to Safety Board investigators or other officials investigating this incident because of a criminal prosecution. Consequently, the investigation cannot determine what information or specific actions he took to identify, diagnose, and respond to the rupture and subsequent release of the gasoline.

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<sup>2</sup> *The Olympic Pipeline company at the time of the incident was owned in partnership by Atlantic Richfield (now British Petroleum), Equilon Pipeline LLC and GATX Terminal Corporation. At the time of the incident, Equilon was under contract to act as the operator for the company.*

Kevin Dyvig, Operations Controller 2. Mr. Dyvig was the operations controller operating the segment of pipeline that had ruptured on June 10, 1999. According to his personnel file, he had satisfactorily completed the required course of study and internship, and became certified as an Operations Controller for Olympic Pipeline Company on October 31, 1983. On his most recent Performance and Development Review (covering the periods from June 1996 to April 1998) he had received either “Outstanding” (the highest performance rating out of seven) or “Strong” (the second highest performance rating) on the majority of the performance factors. His Overall performance rating was determined to be “Strong.” His performance during this rating period was a slight improvement from the previous rating period (June 1992 – June 1994) when he had received a “Good+” (the third highest rating possible). He had successfully completed training on Pipeline Simulator Workshops, and had passed the hydraulics class.

On the day of the accident, Mr. Dyvig was working the 12-hour shift that began at 6:30 a.m. that morning. He had also worked this shift the previous two days.

### **Toxicological Testing**<sup>3</sup>

On June 10, after the accident, Mr. Dyvig and Mr. *Tieken* submitted urine specimens for post-accident toxicological testing. Both results were negative. The post-accident drug test was in accordance with Title 49 CFR §199.11, which states: “As soon as possible but no later than 32 hours after an accident, an operator shall drug test each employee whose performance either contributed to the accident or cannot be completely discounted as a contributing factor.” The regulations require testing for the presence of marijuana, opiates, cocaine, amphetamines, and phencyclidine (PCP).

On September 19, 2001, an Olympic Pipeline management official provided confirmation to the NTSB Investigator-in-Charge that Olympic Pipeline was not able to provide the Safety Board with post-accident test results for the presence of alcohol. According to Title 49 CFR §199.225, post-accident testing for the presence of alcohol should occur “as soon as practicable following an accident.” The regulations further state: “If a test required by this section is not administered within 2 hours following the accident, the operator shall prepare and maintain on file a record stating the reasons the test was not promptly administered. If a test ... is not administered within 8 hours following the accident, the operator shall cease attempts to administer an alcohol test and shall state in the record the reasons for not administering the test.”

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<sup>3</sup> This revised draft includes the Toxicological Testing section that was originally prepared in the first Human Performance Specialist Report as “Addendum 1,” dated September 7, 2001.

## The Bayview Products Terminal

Because the conventional Human Performance investigation could not be conducted, this report will discuss the operating performance implications of the Bayview Products Terminal.

Safety Board investigators were able to interview other Olympic operations controllers and computer technicians who were on duty at the time of the accident. The employees, who contributed to the facts developed in this report, are included in the attachment (See Attachment A).

General Overview - - The Bayview Products Terminal has both the features of a delivery terminal and an *origin location*. It is similar to a delivery terminal in that it has the terminal facility (i.e., products are brought into it). Also, it contains *a booster pumps which feed Olympic's mainline pumps 1.5 miles downstream at Olympic's Allen pump station*. The intent of constructing Bayview, according to an operations controller, was to increase throughput and stabilize throughput issues. Consequently, if the refineries had any kind of reduction or loss of flow, the Bayview Products Terminal could continue pumping its stored product throughout the pipeline system, thereby reducing down time.

Operations Controllers' Perceptions of Operational Problems - - The operations controllers and computer technicians interviewed by Safety Board investigators discussed some operational challenges involved with the operations at Bayview Products Terminal. One controller interviewed indicated that other controllers were initially concerned when Bayview was first commissioned because it was a new and unfamiliar facility. He also stated that different operational issues hadn't had an opportunity to "mature and be formally worked out." He further stated that, during the months after Bayview began operations, some of these issues did get worked out, essentially by trial and error, although the controllers had not had an opportunity to try out all the operations that would have better familiarized them with the Bayview facility.

Bayview's proximity to Allen pump station, according to a controller interviewed, created operational challenges for the operations controllers. For instance, because of the size of the pumps at Allen, product could be drawn away too quickly from Bayview, creating pressure waves. As a result, the pressure switch detecting high pressure would then trigger a block valve at Bayview to close, and there would be an unintended shutdown. (Bayview would experience these unscheduled shutdowns due to *action of the safety devices* within the facility to protect it from overpressure). However, the controller believed that the close proximity lessened the time that controllers had to react to a problem. As a result, the incoming and the outgoing valves at Bayview Products Terminal would close before the operations controllers make adjustments to the system.

Operations Controllers Training on the Bayview Products Terminal - - Olympic had not provided any structured or formal training to its operations controllers after the Bayview Products Terminal became operational. Management believed that it was fundamentally not unlike any other delivery or pump station facility; and stated that it

was designed to operate like any of the other facilities in the system. A section in Olympic's Operations and Maintenance Manual (O&M) had been added discussing the Bayview Products Terminal prior to the station becoming commissioned; management saw no reason to revise sections of the O&M manual discussing the Bayview Products Terminal after the station became operational.

During an abnormal situation along the pipeline, the controller operating that segment of line is expected to identify and remedy that situation, while also continuing to monitor and operate the other segments along his pipeline. Olympic does not have procedures in place whereby another operations controller or supervisor is assigned to modify the abnormal situation or operate other portions of the line. *Olympic stated that they had updated its manuals to reflect the new equipment associated with Bayview Products Terminal, and had posted a flow diagram of Bayview on its control room wall. Otherwise, no new training or operating procedures were introduced to assist the controller in operating the segment of pipeline that included the Bayview Products Terminal, either during normal operations or during abnormal situations.*

Bayview Products Terminal Problems and Controllers' Workload - - The Bayview Products Terminal problems, according to an operations controller, increased the workload of the controllers operating that segment of the pipeline. He further stated that "any time that the facility shuts down and then closes the valves, it interrupts the pipeline and the flow of work...it caused the controller extra work." Another operations controller commented that there was a general sense of frustration with the problems at Bayview. He also stated that he believed that Bayview was built and put online to help controllers run the line smoother, although he did not feel that this was accomplished.

Management's Awareness of the Problems at Bayview - - The operations controllers' concerns with the Bayview Products Terminal were often expressed to supervisors and to the engineering department, who recognized that these problems existed. Controllers indicated that Bayview was a concern, and it was something that needed to be worked on. An employee commented that these problems could have been a safety concern; but he also stated that, "I think it was more of the discussion revolved around being more of just a nuisance or inconvenience."

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Stephen M. Jenner, Ph.D.  
Human Performance Investigator

## **Attachment A**

### **Olympic Employees Interviewed in Response to the Incident.**

Todd Victor Smith. At the time of the accident he was doing occasional work as an operations controller (mainly in a relief capacity), however his duties had shifted more towards doing maintenance and programming on the SCADA system. He has been with Olympic Pipeline for about fifteen years. He was originally hired as a utility pipeliner, and about two years later transferred into operations.

Lloyd Harrison Ticken, Jr. (Operations Controller). He had worked Mobile Pipeline for 15 years, the last 5 years as an operations controller, prior to coming to Olympic Pipeline. He hired on with Olympic Pipeline since 1994 as an operational controller, and was *programming SCADA software on the day of the accident.*

Ronald David Burt. He was hired by Olympic Pipeline in 1986 and briefly worked in the maintenance department. He then began training in field operations, and spent about 8 months there. In early 1987, he began training in the control center as an operations controller, and has worked in this capacity since then. On the day of the accident, he had reported for work about 3:00 p.m., and was operating the Anacortes to Portland segment of pipeline system. About every other day, he operated on the segment of pipeline where the rupture occurred.