Focus on Oil Transfer System Hydrostatic Testing

DEPARTMENT OF ECOLOGY
State of Washington

Spill Prevention Preparedness & Response Program **December 2011**

Introduction

Every day hoses and piping systems transfer millions of gallons of oil over the waters of Washington State. Keeping these hoses and piping systems in good condition is critical in preventing oil spills.

Oil hoses and piping are subject to expansion and contraction from internal and external pressures and temperatures. Movement or contact with other equipment, corrosion or degradation from the environment frequently cause damage to piping and hoses. Performing annual hydrostatic tests can help determine if your oil transfer system is in good condition and able to perform properly.

As a regulated facility, what does Ecology require me to do?

1. Ensure all transfer equipment is properly inspected and tested annually according to WAC 173-180-205.
2. Keep records of oil transfer equipment testing, maintenance and repairs according to WAC 173-180-040.
3. Produce records of tests completed for each transfer system and hose upon request.

Ecology requires annual tests of an oil transfer operator's hoses, piping, manifolds, and any other connected equipment used to transfer oil over the water. Hydrostatic testing may be part of this but is not required. Ecology accepts inspection methods that meet manufacturers' recommendations and industrial standards. Ecology also accepts the U.S. Coast Guard test procedures for oil transfer equipment, including hydrostatic testing. These requirements are found in the Code of Federal Regulations, 33 CFR 156.170. These tests may be performed in-house or by an outside company. You must be able to produce records of the tests performed for each transfer system and hose upon request.

What is hydrostatic testing?

A hydrostatic pressure test introduces stress into the oil transfer system under controlled conditions to ensure safe operation at the Maximum Allowable Working Pressure (MAWP). It involves filling the oil transfer equipment with a pressurized liquid and ensuring the pressure holds while looking for leaks.

WHY IT MATTERS

Hoses, piping and other connected equipment carry oil from one place to another. They can weaken due to normal wear and tear or from lack of maintenance. Testing the system can find weak spots before they rupture and cause a preventable spill.

DEFINITION

The term "hydrostatic" refers to the pressure or force a **liquid** exerts upon its surroundings. In this case, the hose, piping, valves, pumps, and other connected equipment.

FOR MORE INFORMATION:

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Special accommodations:

If you need this publication in an alternate format, call the Spills Program at 360-407-7455. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

A NOTE ON HOSES: Warning signs during testing indicating a hose is not suitable for use: Bulging, swelling like a ring or semi circle, abnormal lengthening [this is according to manufacturer's specifications], and soft spots. These signs point to an internal failure of the hose strength members.

Can I use compressed air instead of liquids?

No. Safety is the main reason. It may be easier to use compressed air but (like a spring) air stores a lot of energy under pressure. If something fails or breaks while under air pressure there is a good chance of a catastrophic failure with explosive release and flying materials. Water and other liquids are essentially incompressible and do not store enough energy to cause a dangerous catastrophic failure.

How do I prepare for a hydrostatic pressure test?

Identify the MAWP of your oil transfer system. The test pressure is required to be 150% of the MAWP. Ensure each part of the transfer system is pressure rated for pressures greater than the test pressure you will be using.

Consider the environmental conditions when scheduling testing. Changes in temperature can cause pressure fluctuations, making it more difficult to tell if the system is holding pressure.

Check applicable standards for hydro-testing, piping and hose integrity. These include:

- 33 CFR 156.170 Equipment test and inspection
- ANSI B31.3 Loading arm design and testing
- ASTM D-380 Test Methods for Rubber Hose
- Rubber Manufacturers Associations Hose Handbook

What does a hydrostatic test look like?

Hydrostatic testing generally consists of:

- Applying the test pressure by filling the component or system with the test liquid while bleeding out any air or other gas, and allowing the transfer system or component to expand.
- Adding make-up liquid to reach the test pressure of 150% of the MAWP. After initial expansion of the system or component has stopped the test period begins.
- Inspecting the transfer system or component for leaks and failure signs during the test period while monitoring the system pressure to ensure no unexplained change occurs.
- Locating and repairing or replacing any failing component responsible for a pressure loss. [A retest would be required after any corrective actions such as a repair or replacement.]
- Documenting the test and results. This includes stenciling tested components with the date of the successful test and MAWP.

What if the system leaks during testing?

If any oil or oily hydrostatic test water has spilled outside of containment from a leak during testing report it to Ecology, the U.S. Coast Guard and U.S. Environmental Protection Agency in accordance with applicable regulations.

Other recommendations for hydrostatic testing

Ecology recommends that the oil transfer system be monitored closely during the first few uses following the successful hydrostatic test.

For more information or technical assistance contact:

Ecology Spills Program web site:
http://www.ecy.wa.gov/programs/spills/spills.html