94-01

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16451
15 August 1994

From: Commander, Eighth Coast Guard District
To: Distribution

Subj: FACILITY PIPELINE TESTING

1. Enclosure (1) is forwarded for your information and use. Ensure that comments are sent via this office.

R. A. BLAIS
By direction

Encl: COMDT (G-MEP-1) ltr 16451 of 3 Aug 1994

Dist: All Eighth District MSOs

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AUG , 3 1991

From: Commandant
To: Commander, Eighth Coast Guard District (m)

Subj: FACILITY PIPELINE TESTING

Ref: (a) COMDT (G-MEP) msg 102116Z of Feb 92

1. The General Accounting Office audit in June 1991 was critical of the Coast Guard's testing policy of transfer pipe systems at marine transportation related facilities handling oil or hazardous material in bulk. Reference (a) was distributed to the field reaffirming Coast Guard policy. To ensure consistency, the message directed COTP's to forward all requests for alternative pipeline testing to Commandant (G-MEP-1) for evaluation. This letter rescinds that directive. Requests for alternatives that are addressed in enclosure (1) shall be handled by the COTP. Requests for testing alternatives, not addressed by enclosure (1) shall continue to be forwarded to Commandant (G-MEP-1) for coordination of Headquarters review.

2. Since July 1991, Commandant (G-MEP) has been actively working with Commandant (G-MTH) to establish a national policy on pipeline testing and bulk liquid facility inspection so that the authority to grant alternatives to the requirements of 33 CFR 156.170 could be returned to the Captain of the Port. Enclosure (1) provides minimum requirements for the required static liquid test for pipelines and possible alternative criteria for pneumatic testing. Guidance for testing transfer hoses is also included.

3. Working with Commandant (G-MTH) and outside agencies, Commandant (G-MEP-1) will continue to develop testing protocols for additional types of alternative methods such as non-destructive testing, e.g. acoustic and ultrasonic. In the meantime, any questions on facility pipeline testing shall be directed to Commandant (G-MEP-1).

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4. Comments on the use and applicability of enclosure (1) are solicited. After six months of trial the alternative testing procedures will be incorporated into Chapter IX of the Marine Safety Manual.

5. LT Jon Burton, on the Commandant (G-MEP-1) staff, is the point of contact for this issue.

Encl: (1) Pipeline and Hose Testing Policy

3 August 1994

MARINE TRANSPORTATION RELATED FACILITIES

HANDLING OIL OR HAZARDOUS MATERIAL IN BULK

PIPELINE TESTING POLICY

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I. JURISDICTION FOR MARINE TRANSPORTATION RELATED PIPELINE AT FACILITIES HANDLING OIL AND HAZARDOUS MATERIAL IN BULK

Under a 1971 Memorandum of Understanding (MOU) between the Department of Transportation (DOT) and the Environmental Protection Agency (EPA), implementing Section 311(j)(1)(c) of the Federal Water Pollution Control Act, responsibility for marine transportation related facilities (MTR) was delegated to the Coast Guard. The Coast Guard is required to ensure testing is conducted by the facility along the entire marine transfer pipe system. These tests can either be conducted by facility personnel or a third party entity. The goal of our pipeline testing policy is to identify and eliminate pollution risks from transfer piping. Coast Guard's policy on the extent of pipeline testing is as follows.

A. For MTR co-located with non-transportation related facilities protected by Spill Prevention Control and Countermeasure (SPCC) Plans required by the EPA:

> Oil transfer piping systems will be tested from the dock loading arm or manifold of the Coast Guard inspected MTR up to the first valve encountered after the pipe enters the SPCC area required under 40 CFR 112.7(c).

If the EPA expands a facility's SPCC containment area, then the extent of pipeline testing monitored by the Coast Guard should be adjusted accordingly.

NOTE: The areas controlled by SPCC Plans provide pollution prevention for transfer piping located inside those areas. The EPA has not yet established a similar pollution prevention program for hazardous liquid storage facilities. Currently, many bulk liquid facilities handling both oil and hazardous materials are already afforded adequate protection from hazardous material pollution by virtue of an existing SPCC Plan. However, some bulk hazardous liquid MTR may not be protected by an SPCC Plan, or the SPCC Plan may not prevent pollution from certain types of bulk liquid hazardous materials transferred at the facility.

B. For MTR co-located with non-transportation related facilities not protected by SPCC Plans required by the US EPA:

> Piping systems will be tested from the dock loading arm or manifold of the Coast Guard inspected marine transportation related facility up to the first valve encountered after the pipe enters the secondary containment around the bulk storage tank required in 40 CFR 112.7(e)(2).

If conformance with this policy is not economically or physically practical for a facility without SPCC containment, the facility can submit an application for alternative testing to Commandant (G-MEP-1), via the COTP, per 33 CFR 154.108.

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II. STATIC LIQUID TESTING REQUIREMENTS FOR MARINE TRANSPORTATION RELATED PIPELINE HANDLING OIL AND HAZARDOUS MATERIAL IN BULK

The static liquid pressure test is required for marine transportation related pipelines handling oil and hazardous material in bulk to ensure their integrity and safety. It is a gross test that provides general information on the pipelines susceptibility to leakage and its overall strength. The following guidelines contain minimum requirements for conducting the static liquid test. Refer to 33 CFR 156.170 for other testing requirements.

The static liquid test is normally performed using water. However, other test mediums can be used without requesting an alternative from the COTP.

REQUIREMENTS FOR THE STATIC LIQUID TEST

(1) Test pressure and frequency

A. 33 CFR 156.170 requires that transfer pipeline be tested annually by the facility at 1½ times the Maximum Allowable Working Pressure (MAWP). **The MAWP is the designed working pressure of the pipe. Unlike transfer hoses there is no established minimum MAWP for transfer pipeline.** The operating pressure (i.e. the upper pressure at which the facility decides to limit their operations) may be substituted for the MAWP if the facility operator can demonstrate to the COTP's satisfaction that mechanical safeguards, such as relief valves or pump controls, are in place to limit pump pressure to a value below the MAWP.

B. At no time during the static liquid test may any part of the piping system be subjected to a stress greater than 90% of its yield strength at test temperature.

C. The test pressure must not exceed the maximum rated pressure of any component in the system.

(2) Test medium

A. If the liquid is flammable, its flash point shall be at least 49°C (120°F).

B. The test medium must be compatible with the cargo handled and the piping material.

C. The temperature of the test medium must be compatible with the normal temperatures of the products transferred under the given ambient conditions.

D. Consideration should be given to the toxicity of the liquid, its potential for pollution if spilled, and the safety of personnel in the vicinity.

(3) Test criteria

A. For pipe that can be visually examined, the test pressure shall be maintained for a minimum of 10 minutes and held for such additional time as may be necessary to conduct the examination for leakage.

B. For pipe that is buried or insulated and can not be visually examined, the pressure shall be maintained for 1 hour.

C. Insure all items (i.e. valves, pumps, etc.) that should not be subjected to the test pressure have been disconnected or isolated by blanking or other suitable means.

D. If the testing medium in the system is subject to thermal expansion during the test, provisions shall be made for immediate safe relief of excess pressure. Effects of temperature changes shall be taken into account when interpretations are made of recorded test pressures.

E. Immediately after completion of the static liquid test, it is important in cold weather that the lines, valves, and fittings be drained completely of any liquid prone to freezing to avoid damage to the pipeline.

(4) Acceptance criteria

A. The pipe and all joint sections must maintain the test pressure for the duration of the test without damage or permanent distortion.

B. No leakage is allowed during the static leak test. For pipe that can be visually examined, leakage should be physically checked.

C. Should a leak occur during the test, the line section or component part shall be repaired or replaced to the satisfaction of the COTP and re-tested.

ALTERNATIVE TESTING FOR MTR RELATED PIPELINE AT FACILITIES HANDLING OIL AND HAZARDOUS MATERIAL IN BULK

The COTP may consider and approve alternative procedures, methods, or equipment standards to be used by the facility operator under 33 CFR 156.107. All testing methods, other than a static liquid test, shall be considered an alternative. Criteria have been established for evaluating the need for an alternative testing method. If it is determined that a testing alternative is appropriate then it may be approved by the COTP, without further review, if the plan for using that method is consistent with this policy. All other requests should be forwarded to Commandant (G-MEP) for review with a recommendation from the COTP.

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All alternatives for pipeline testing must offer an equivalent level of safety and protection from pollution to substitute to the required static liquid test. Alternatives should not be approved if testing is for initial installation or following major alterations to the system.

Alternatives should only be approved when compliance with static liquid test requirements would be economically or physically impractical. Alternatives have been approved when:

the length of transfer system makes the costs of conducting the test and/or disposing of contaminated liquid excessive;

the product medium is reactive with water and testing would risk harm to personnel and property; or

exclusive lines used to transfer hazardous materials would be contaminated by the test medium.

Once it has been determined that an alternative testing procedure may be warranted, the following information should be considered in evaluating the request.

1. The age of the piping and dimensions of the system.

2. The commodities transferred and the system's operations.

3. The history of the system including the system's compliance performance and past discharges and releases.

4. Access to transfer system: whether system is buried, elevated, insulated, etc.

5. The presence of any relief valves in the system and their routine maintenance schedule.

6. Proximity to environmentally or economically sensitive or hazardous areas.

7. The date of the last static liquid test.

8. The system Maximum Allowable Working Pressure (MAWP), system operating pressure, and relief valve settings.

NOTE: Specific procedures should be included in the Facility Operations Manual. Alternatives can be withdrawn at any time if the COTP believes that safety and pollution prevention requirements are not adequately met.

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PNEUMATIC PRESSURE TESTING ALTERNATIVE FOR TRANSFER PIPELINES

Procedures for conducting an alternative testing method for pneumatic pressure testing have been established and should be referenced by the COTP in evaluating such requests.

Unlike the static liquid pressure test, pneumatic pressure testing involves the compression of a gas. This compressed gas may constitute an enormous amount of stored energy which, in the event of a failure, releases suddenly with tremendous force. Special precautions to ensure the safety of personnel and property must be taken whenever a pneumatic pressure test is conducted.

The pneumatic test can be an acceptable alternative for testing pipeline facilities provided the following minimum safety precautions are taken:

(1) Test pressure and duration

A. IF OPERATING PRESSURE > 25% MAWP (DESIGN PRESSURE OF PIPE)

For pipe that can be visually examined, the pneumatic test pressure must be maintained at 1.25 times the MAWP for a minimum of 10 minutes and then reduced to 700 kPa (100 psi) or the operating pressure (ex. relief valve setting), whichever is less for such additional time as may be necessary to conduct the examination for leaks.

For pipe that can not be visually examined, the pneumatic test pressure must be maintained at 1.25 times the MAWP for 10 minutes then followed by a reduced pressure leak test equivalent to not less than 1.1 times the MAWP for not less than 1 hour.

B. IF OPERATING PRESSURE < 25% MAWP (DESIGN PRESSURE OF PIPE)

For pipe that can be visually examined, the pneumatic test pressure must be maintained at 700 kPa (100 psi) or .25 times the MAWP, whichever is less for a minimum of 10 minutes and for such additional time as may be necessary to conduct the examination for leakage.

For pipe that can not be visually examined, the pneumatic test pressure must be maintained at 700 kPa (100 psi) or .25 times the MAWP, whichever is less, for a minimum of 1 hour.

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III. TESTING REQUIREMENTS FOR TRANSFER HOSES

The hose that runs between the facility's manifold and the vessel's deck manifold is separate and distinct from the transfer pipe system. The following guidelines contain minimum requirements for testing transfer hoses. These tests are to be done annually by the facility. Refer to 33 CFR 156.170 for other testing requirements.

Alternative testing methods are not normally necessary since the hose can be removed for testing. Any alternative, other than that preestablished by this policy for testing transfer hoses should be referred to G-MEP with a recommendation from the COTP.

The static liquid test is normally performed using water. However, other test mediums can be used without requesting an alternative from the COTP.

REQUIREMENTS FOR TESTING HOSES USED UNDER PRESSURE

(1) Test pressure

Hoses used under pressure must be inspected annually at 1½ the Maximum Allowable Working Pressure (MAWP), but not less than 1550 kPa (@225 psi). This figure represents 1½ times the minimum MAWP of 1040 kPa (@150 psi), required for facility hose assemblies under 33 CFR 154.500.

At no time should the hose be subjected to a stress greater than 90% the yield strength at test temperature.

(2) Test medium

A. If the liquid is flammable, its flash point shall be at least 49°C (120°F).

B. The test medium must be compatible with the cargo handles and transfer hose tube as recommended by the hose manufacturer.

C. The temperature of the test medium must be compatible with the normal temperatures of the products transferred under the given ambient conditions.

D. Consideration should be given to the toxicity of the liquid, its potential for pollution if spilled, and the safety of personnel in the vicinity.

(3) Test duration

Pressure shall be continuously maintained for a minimum time of 10 minutes and held for such time as may be necessary to conduct the examination for leakage.

(2) Test medium

The gas used as test fluid, if not dry air, shall be non-flammable, non-toxic and compatible with any cargo residue in the pipe material. The temperature of the gas must be compatible with the pipe material.

(3) Other Considerations

A. For pipe that can be visually examined, the test equipment must be examined before pressure is applied to ensure that it is tight and that all items that should not be subjected to the test pressure have been disconnected or isolated by valves or other suitable means.

B. The pressure in the system must gradually be increased to not more than one-half of the test pressure after which the pressure is increased in steps of approximately one tenth of the test pressure until the required test pressure has been reached.

C. A safety zone, in accordance with local code, should be established around the pipe and should allow only essential personnel to enter the zone for purposes of conducting the test or examining the pipe for leaks.

D. If the testing medium in the system is subject to thermal expansion during the test, provisions shall be made for the immediate safe relief of excess pressure. Effects of temperature changes shall be taken into account when interpretations are made of recorded test pressures.

(4) Acceptance criteria

A. The pipe must maintain the test pressure for the duration of the test without damage or permanent distortion.

B. No leakage is allowed during the leak test. For pipe that can be visually examined, leakage should be checked by the use of a reliable method such as with a liquid soap solution.

C. Should a leak occur during the test, the line section or component part shall be repaired or replaced and re-tested.

HAZARDOUS MATERIALS: Pipelines must be purged of hazardous material products before testing to the extent that a material failure or leakage during the test will not create a hazard.

NOTE: A professional engineer may certify the results of tests that meets Coast Guard pneumatic testing requirements.

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(4) Acceptance criteria

A. The hose must maintain the test pressure for the duration of the test without damage or permanent distortion.

B. No leakage is allowed during the test.

ALTERNATIVE TESTING METHOD FOR HOSES USED EXCLUSIVELY IN GRAVITY TRANSFERS

Alternative testing methods are not normally necessary since the hose can be removed for testing. Any alternative, other than that established by this policy for testing transfer hoses should be referred to G-MEP with a recommendation from the COTP.

Where transfers are conducted by a gravity method, an alternative testing pressure to 33 CFR 154.500(b) can be used for the hose that runs between the facility's manifold and the vessel's deck manifold if the hose is permanently attached to the facility. For the purpose of the test, a MAWP determined by an operating pressure less than the 150 psi Maximum Allowable Working Pressure (MAWP) is acceptable provided the following conditions are met:

(1) The hose is labelled "GRAVITY ONLY".

(2) The hose is maintained at a fixed operating pressure (ex. relief valve setting of the piping).

(3) The hose is tested annually at 1.5 times the maximum operating pressure.

(4) The material condition of the hose is inspected annually.

(5) The alternative is only granted for those hoses used to transfer product from a facility to a vessel where no pumps are connected during the transfer.

(6) If the components that comprise the transfer system are changed, the alternative is rescinded and a new request must be made.

(7) All other requirements for testing pressure hoses apply.