18 Pipe Testing

The technical aspects of testing a pipeline under hydrostatic pressure after it is in place and before it is put into service are based on standard practice and are well covered by existing regulations. There are, however, environmental aspects to the testing of a northern pipeline that require regulation because of the very large volumes of test liquid and its effects on the aquatic environment.

To prevent the test medium from freezing in the pipe, it will be necessary to use either warm water or an antifreeze mixture of water and methanol. Foothills suggested that the antifreeze mixture could be as much as 70 percent methanol, and Arctic Gas suggested 26 percent. In either case, very large volumes of methanol and water will be used. For example, a three-mile length of pipe, the length suggested for a test section, would hold over 1 million gallons. Whether or not this volume is all water or is a water-methanol mixture, there are obvious and major problems related to water withdrawal, the handling of methanol, contingency plans for spills, and the disposal of the warm water or the water-methanol mixture. Most of these problems can be handled by applying the recommendations advanced in the chapters entitled Water Withdrawals, Waste Management, Management of Fuels and Hazardous Substances and The Physical Environment: Water. However, there are some specific issues that warrant mention here.

The first relates to the withdrawal, then disposal, of the large amounts of water that will be required to test the pipe. Millions of gallons of water will have to be withdrawn from one location and disposed of in another several miles away. This prospect raises a number of biological concerns, such as the impact on the location from which the water is withdrawn, and the possibility of transferring water from one watershed to another. If a water-methanol mixture is used, it will be made up at one point, then reused in successive sections of the pipeline before it is ultimately discharged. A test with warm water will require not only the volume of water needed for the test, but also water to flush and warm each section of the pipe before it is tested. This method will require much more water, and it will preclude the reuse of the test liquid, which is possible within a closed system if the water-methanol mixture is used. In either case, the discharge of such large quantities of water could create significant environmental problems, such as melting of river ice at the point of discharge, melting of snow cover over the ice or along stream banks, erosion of bank material, and, when the water has cooled, an increased thickness of river ice that may alter spring break-up patterns.

The second, and perhaps the most troublesome, issue is related to the toxic nature of methanol and, in particular, to its high biological oxygen demand. Although contaminants may be picked up from within the pipeline, even with a warm water test, they probably represent a minor problem in comparison with the toxic and asphyxiating nature of methanol. The pipeline companies have said that, after testing is complete, the methanol will be concentrated by distillation, then burned or used for other purposes; the water from the mixture will either be sprayed onto land or frozen water surfaces or metered into suitable watercourses. Alternatively, the mixture might be diluted with more water, until it contains less than one percent methanol by volume, then disposed of in suitable watercourses. This latter technique has been severely criticized because it would require inordinately large volumes of water and because the total volume of methanol would create a high oxygen demand in the receiving environment.

I am not satisfied that the toxicity of methanol to fish and fish eggs is adequately understood, and I conclude that the possible effects of disposing of the methanol mixture or a distillate residue have not been adequately dealt with. Both Arctic Gas and Foothills have, in my opinion, underestimated the practical problems associated with disposing of the enormous quantities of methanol waste. In particular, they have minimized the high demand for biological oxygen that the methanol will make. As noted in the report of the National Energy Board, small-scale studies of the effects of such a discharge do not provide any assurance that the environmental effects of a large-scale discharge can be overcome. The possible effects on water quality and fish are troubling, and they require the utmost caution.

The third issue involves contingency plans for an accidental spill during testing. Again, the toxicity of methanol is the cause of gravest concern, although a warm water spill would cause melting and erosion, and it could cause problems of thermal shock. The transportation, transfer and storage of the test liquids will have to comply with the recommendations and guidelines presented in the chapter entitled Management of Fuels and Hazardous Substances. I assume, of course, that the most rigorous procedures to maintain quality control will be employed during the construction period to minimize the risk of pipe failure, but special and comprehensive measures must also be developed to contain a spill and to minimize its effects on the environment, should a spill occur during any part of the testing process. No such measures exist in the documentation presented to me, and it appears that the pipeline companies have seriously underestimated the importance of planning for this possibility.

With these points in mind, and recognizing that other chapters of this report cover many issues related to testing the pipeline, I put forward the following recommendations.

1. *Before construction of the pipeline begins, the Company shall prepare for approval by the Agency detailed plans for pressure testing. In addition to information required by existing regulations, these plans shall detail the environmental effects and the measures that will be used during a typical water or water-methanol hydrostatic test sequence to mitigate these effects.*

2. *Pipe testing shall be carried out only under a permit from and in the presence of a representative of the Agency. The Company shall make site-specific and separate applications to the Agency to test the pipe for each spread season during which these tests will be conducted. Each application shall be consistent with and keyed to the overall plans and the recommendations specified in The Physical Environment: Water, and in Fish, Water Withdrawals, Waste Management, and Management of Fuels and Hazardous Substances.*

3. *Each application to test the pipe shall note clearly and concisely the location or locations at which the following operations are proposed: withdrawal; pretreatment or heating of water; the mixing of methanol and water; the filling of test section or sections; the storage of water or water-methanol mixture in the pipe between tests or from one construction season until the next; the emptying of test section or sections; and the treatment and disposal of the test medium. Each application shall also detail the equipment and procedures to be used, the quantities and temperatures of water and methanol involved, and the dates and times of the proposed operations.*

The potential toxicity of the effluent from pipe testing operations must be investigated before any effluent is discharged. The procedures for the toxicity test should be specified by the Toxicity Coordination Committee of the Environmental Protection Service, Department of the Environment, and should include provisions similar to those outlined in the Petroleum Refinery Effluent Regulations and Guidelines *(prepared by the Environmental Protection Service, 1974).*

4. *The water-methanol test mixture shall be disposed of by distillation, and the distillate shall be burned or used in some approved way, and the residue liquid shall be effectively treated before it is discharged. Disposal of the test mixture by dilution shall be prohibited.*

Because of the large volumes and high biological oxygen demand of residues that contain methanol, the treatment standards, if they are to protect the environment, may well have to exceed the effluent standards prescribed in Waste Management.

5. *Before disposal, the Company shall treat all test liquids, including the water used to heat the pipeline, to reduce concentrations of oils, organic carbon compounds and particulates to acceptable levels.*

6. *The Company shall store the methanol test mixture between tests, or from one construction season to the next, in steel tanks or bladder tanks in accordance with the recommendations made in Management of Fuels and Hazardous Substances: Spill Prevention. Mixtures stored in completed sections of pipeline shall be stored only in sections that have been successfully pressure tested and have been approved by the Agency for storage purposes.*

7. *The Company shall submit detailed contingency plans for each spread season during which hydrostatic tests will be conducted, outlining methods to contain and recover spills of warm water, water-methanol or pure methanol, should the pipe or any associated equipment fail during testing. These plans will include methods of detection, notification, decision-making, containment, countermeasures, clean-up and disposal of test media, as well as plans for restoration that adequately reflect concerns for vegetation, surface waters, and wildlife habitats. All plans must be approved by the Agency. Catchment devices may have to be installed before the pipe is tested to prevent any spilled fluid from reaching a waterbody that may be highly sensitive to pollution.*

8. *The Company shall submit to the Agency for approval plans for the location and repair of failures during pressure testing.*

The repair of any failure in the pipe during the testing of it shall depend on access to the site of the failure. The Company should not assume that the construction season will be extended for the repair of any section of pipe that fails during testing. This limitation is particularly important in areas that are seasonally critical to wildlife and fish and in areas to which access is by snow roads.