

PREFILED TESTIMONY OF ROBERT A. CLARK, Ph.D.

ISSUE: Potential degradation of Cross Valley Water District service piping in the event of hydrocarbon leakage. Possible effects of Cross Cascade Pipeline cathodic protection on nearby metallic structures.

SPONSOR: Cross Valley Water District

I, Robert A. Clark, have a doctorate in materials science and engineering and have been practicing continuously in the field since 1976. My practice deals with degradation of materials, failure analysis/forensics, and corrosion evaluations. I am currently employed by Golder Associates Incorporated; Golder has been retained by Cross Valley Water District (CVWD) to evaluate various aspects pertaining to the proposed Cross Cascade Pipeline through the CVWD aquifer and service area. In particular I evaluated the potential effects of hydrocarbon leakage from the proposed pipeline on the service pipelines of the CVWD.

In conducting my evaluation I referred to a map provided by CVWD identifying the path of the Cross Cascade Pipeline and its relation to CVWD service lines (RAC-1). I was provided information by CVWD/S T Engineering, Inc concerning the materials of construction of CVWD service lines. I reviewed Cross Cascade Pipeline documents 2.3 Construction on Site and 2.14 Construction Methodology. I reviewed technical literature pertaining to the resistance of CVWD service line materials to the hydrocarbon products proposed for transport in the Cross Cascade Pipeline, and also contacted manufacturers of those materials.

A summary of my findings is included in my report 98-171.RC dated November 6, 1998 to CVWD (RAC-2). The conclusions of this report (RAC-2 pp.1 and 2) are that the high density polyethylene (HDPE) pipe material used in CVWD service lines has very poor resistance to the hydrocarbons proposed for transport in the Cross Cascade Pipeline. These conclusions are supported by technical literature, copies of which are provided in (RAC-2 attachments A, B and C). Thus it is my opinion that should there be leakage from the Cross Cascade Pipeline near where it crosses CVWD service lines, these service lines will rapidly degrade resulting in possible contamination of the line contents and subsequent failure of the service lines. From the materials I have reviewed there is no evidence that leak detection in the Cross Cascade Pipeline, especially of smaller leaks, would be sufficient to address the potential problem of degrading CVWD HDPE service lines without warning.

A similar finding was reached concerning styrene-butadiene rubber gaskets that CVWD has indicated are used in their system. Again our investigation is summarized in Golder's report 98-171.RC (RAC-2 pp. 1 and 2) and supported by the technical literature, examples of which are provided in RAC-2 attachments B and D. Styrene-butadiene rubber has poor resistance to degradation in the presence of hydrocarbons similar to those

47 proposed for transport through the Cross Cascade Pipeline. Any hydrocarbon product
48 leakage in the vicinity of this gasket material would rapidly degrade the integrity of the
49 gasket and result in loss of serviceability of the water line.

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51 My review of Cross Cascade Pipeline document 2.3 included discussion on pages 2.3-12
52 through 2.3-15 of the proposed cathodic protection system. There is nothing in the
53 material on cathodic protection that addresses the potential effects on non-protected
54 metallic structures in the vicinity of the cathodically protected petroleum product
55 pipeline. In particular non-protected metallic structures, including metallic pipelines such
56 as some in use by CVWD, may be adversely affected by ground currents produced by the
57 cathodic protection system. These effects could include significantly increased corrosion
58 rates on non-protected structures/pipelines in the vicinity of the proposed petroleum
59 pipeline. The cathodic protection system implementation plan for the Cross Cascade
60 Pipeline needs to address how the implementation will take into account identifying
61 possible effected structures/pipelines and assuring that they are not subjected to enhanced
62 corrosion.

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