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MEMORANDUM FOR: Mark Logsdon
High Level Waste Technical Branch
Development Branch
Division of Waste Management

FROM: Matthew Gordon
High Level Waste Licensing
Management Branch
Division of Waste Management

SUBJECT: REVIEW OF SD-BWI-TS-007

I have reviewed the subject document per your request and I offer the following comments:

The recommendations for future use of the Van der Kamp slug test method at Hanford offered by RHO on page 30 of the subject document are quite responsive to points brought up by GeoTrans in their analysis [Memo to Teek Verma (WMHT) from Ben Ross (GeoTrans) dated August 3, 1982]. In particular, recommendation #2 regarding the assessment of frictional effects and turbulent effects which reduce the validity of the Van der Kamp test results is especially responsive. However, BWIP has not adequately defended past applications of the Van der Kamp method, and has not developed a clear acceptability criterion for future applications of the method.

The use of Van der Kamp analyses in the past is defended by favorable comparisons with alternative testing methods (eg., pump tests with Theis analysis). However, it is noted that tubing friction losses may be significant for the tests at Hanford, and that friction loss effects require additional study. No attempt at quantifying these effects is made in the document. The subject document is therefore incomplete in that it does not assess the validity of past tests in terms of the recommendations it makes for future tests.

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Van der Kamp (Water Resources Research, Vol. 12, no. 1, 1976) notes that the effects of well (tubing) friction may be neglected if flow is laminar and

$$4\nu/(r_c^2) \ll \gamma \qquad (1)$$

where ν = kinematic viscosity of water in tube, r_c = casing radius, and γ = damping factor. The value of γ at 50° C (approximate formation temperature) is $5.51 * 10^{-7}$ m^2/sec. Assuming this value, a rough test of the criterion (1) for each of the four cases studied in the subject document yields:

Well	$4\nu/r_c^2$	γ	Ratio of $(4\nu/r_c^2)$ to γ
DC-14	.0135	.0171 (Test 1)	.79
		.0172 (Test 2)	.79
RRL-2	.0053	.0173 (Test 1)	.30
		.0192 (Test 2)	.28
RRL-2	.0053	.0155 (Test 1)	.34
		.0146 (Test 2)	.36
Ford	.0021	.0186	.11

The values of the ratio in the last column should be << 1 according to criterion (1). For comparison, the values of the ratio for van der Kamp's (underdamped) field tests were less than 1% in all cases. While the problems with the DC-14 test are noted in the document, the potential for error in the other test results is not evaluated, other than to note correspondence of the Van der Kamp results with the results of alternative testing methods. Since it is possible that the alternative tests may have similarly trending errors, the validity of the Van der Kamp results in these cases is still in question. BWIP therefore must address the following question: At what value of the ratio would BWIP judge Van der Kamp results to be acceptable?

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In sum, this document is clearly a step in the right direction, and has been somewhat responsive to NRC's concerns. However, it does not, in itself, represent a final resolution of the issue of the validity of the Van der Kamp test results. An acceptability criterion for Van der Kamp analyses must be quantified and implemented by BWIP.

Original Signed by
Regis R. Davis

Matthew Gordon
High-Level Waste Licensing
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