Bob Hall Chevrolet.
Yak. Cnty

PLSA

ENGINEERING & SURVEYING

BRADLEY J. CARD, P.E.
DOUG KUHN, P.E.
LOUIE W. WISHERT, JR., PLS
RICHARD L. WEHR, PLS

March 23, 2004

Mr. Norman T. Hepner, P.E.
Site Manager-Engineer
Toxics Cleanup Program
Washington State Department of Ecology
15 West Yakima Avenue
Yakima, WA 98902

Re: Alders Chevron, 1602 Terrace Heights Way, Yakima, Washington

Dear Mr. Hepner:

Your letter of March 8, 2004 excludes groundwater from your "no further action" determination. It appears this is due to two separate issues. The first of these is the status of the groundwater monitoring well numbers 1, 2, and 4. There is no record of them being abandoned. However, the site has been graded and paved with impervious asphaltic concrete, which would effectively exclude surface water from entering the wells if they do indeed still exist.

The second issue relates to residual TPH-D and possible VOC contamination in the groundwater. There are analytical reports relating to the THP-D contamination, but documentation of any other contaminant or record of the source of contamination remains to be found. If the contamination was from a heating oil tank, this could explain the lack of record of any contaminants other than diesel.

The source of contamination was reported to have been removed in 1992, 12 years ago. PLSA has become vastly familiar with groundwater movement near I 82 from Yakima Avenue to Nob Hill Boulevard through involvement with four separate cleanups in that area. All of these cleanups involved large excavations to well below the water table where it was possible to directly observe the direction and volume of groundwater flow. A cleanup at the Chevron Station at 18th Street and Nob Hill Boulevard was observed to have been purged of the remains of a 1200 gallon, underground gasoline release in approximately thirty days. This must be the near record for time required for natural attenuation. Further investigation at this site provided information that the ground water velocity at that location is approximately a phenomenal ¼ mile a day!

Attached spread sheets show mathematical ground water parameters and residual contaminant concentration after 12 years of 100 kilograms of substance released into the gravel soils at the former Alder Chevron station. The hydraulic gradient was determined from Groundwater Technology "GROUNDWATER ELEVATION AND CONTOURS MAP

6/25/93". A copy of the Groundwater Technology drawing is attached. The groundwater transport model spreadsheets use assumed conservative hydraulic conductivity values of 0.1 lcm/second and 1 cm/sec, respectively. PLSA has observed values of this or greater magnitude in similar nearby gravel strata.

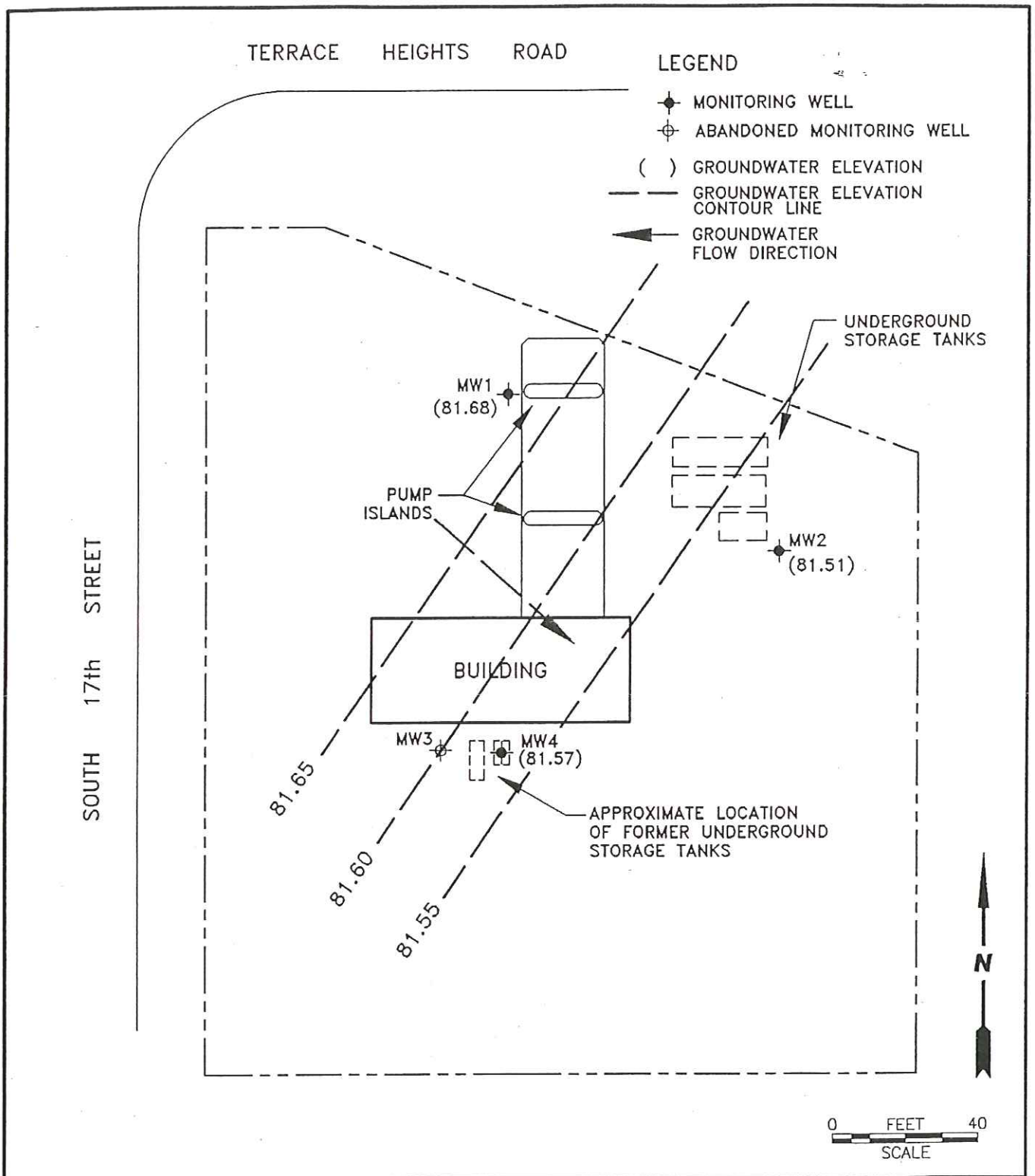
At 30 meters from the source, the more conservative 0.1 cm/sec determination finds residual contamination to be less than 2 exp–8 after 12 years According to Groundwater Technology "Groundwater Monitoring Report April – June 1993", the last TPH – D determination dated 5/14/92 was 12 mg/l. Based on the enclosed hydrogeological modeling this TPH-D concentration would be reduced by natural attenuation to less than the 0.5 mg/l specified for cleanup of groundwater in WAC 173-340 Table 720-1.

Sincerely,

Brad Card, P.E.
Principal Engineer

BRADLEY J. CARD
STATE OF WASHINGTON
12895
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 2/18/05

BC:jc
enclosures
cc Bob Hall

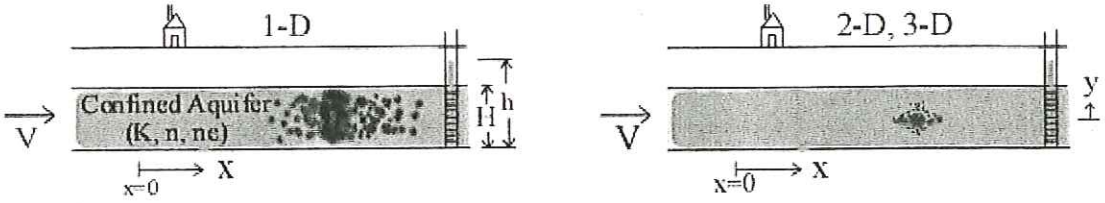


GROUNDWATER TECHNOLOGY 19033 W. VALLEY HWY KENT, WASHINGTON (206) 251-5441				GROUNDWATER ELEVATION AND CONTOURS MAP (6/25/93)		
CLIENT: CHEVRON U.S.A. PRODUCTS Co. SERVICE STATION No. 60093883				LOCATION: 1602 TERRACE HEIGHTS ROAD YAKIMA, WASHINGTON	REV. NO.: 1	DATE: 8/13/93
PM	PE/RG	DESIGNED SH	DETAILED CY	ACAD FILE: SP893	PROJECT NO.: 020603835	FIGURE: 3

Groundwater Contaminant Transport: 3D Slug Injection

Mass of chemical instantaneously injected into an aquifer. Compute concentration, mass, or distances. 1-D, 2-D, or 3D with advection and dispersion.

To: LMNO Engineering home page Trouble printing?
Compute gradient from well head measurements
1-D Step injection with advection, dispersion, retardation Unit Conversions Registration



Register to enable "Calculate" button.

All features enabled	Concentration, C (mg/l):	1.6555009355326035E-77
Click to Calculate	Injected Mass, M (kg):	100.0
	Time, t (day):	1000.0
Solve for Concentration	Distance, x (m):	30.0
Three dimensional dispersion	Distance, y (m):	1.0
Gravelly Soil (sets K, n, ne)	Distance, z (m):	0.5
http://www.LMNOeng.com	Dispersivity in x, aX (m):	10.0
Concentration in mg/l or ppm	Dispersivity in y, aY (m):	1.0
Mass in kg	Dispersivity in z, aZ (m):	1.0
Time in days	Diffusion Coeff, D* (m^2/s):	1.0E-9
Distances in m	Hydraulic Cond, K (cm/s):	1.0
Dispersivities in m	Hydraulic Grad, -dh/dx (m/m):	0.0020
Diff. and Disp. Coeff. in m^2/s	Total Porosity, n (%):	30.0
Hydraulic Conductivity in cm/s	Effective Porosity, ne (%):	25.0
Hydraulic Gradient in m/m (ft/ft)	Pore Water Velocity, V (m/s):	8.0E-5
Velocity in m/s	Dispersion Coeff in x, Dx (m^2/s):	8.00004E-4
	Dispersion Coeff in y, Dy (m^2/s):	8.0004E-5
	Dispersion Coeff in z, Dz (m^2/s):	8.0004E-5
	Plume centerline, V*t (m):	6912.000000000001

Introduction

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This calculation simulates one, two, or three-dimensional transport of a chemical in a confined groundwater aquifer. It is also valid for transport in an unconfined aquifer if the head gradient (*dh/dx*) is nearly constant. The calculation simulates instantaneous injection of a chemical having a mass *M*. The calculation solves for concentration at whatever time and distances are desired by the user. It also can back-calculate mass or distances.

Groundwater Contaminant Transport: 3D Slug Injection

Mass of chemical instantaneously injected into an aquifer. Compute concentration, mass, or distances. 1-D, 2-D, or 3D with advection and dispersion.

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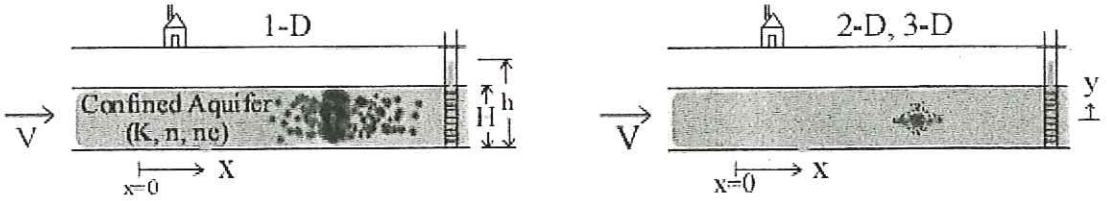

Register to enable "Calculate" button.

All features enabled	Concentration, C (mg/l):	1.767149884577022E-8
Click to Calculate	Injected Mass, M (kg):	100.0
	Time, t (day):	1000.0
Solve for Concentration	Distance, x (m):	30.0
Three dimensional dispersion	Distance, y (m):	1.0
Gravelly Soil (sets K, n, ne)	Distance, z (m):	0.5
http://www.LMNOeng.com	Dispersivity in x, aX (m):	10.0
Concentration in mg/l or ppm	Dispersivity in y, aY (m):	1.0
Mass in kg	Dispersivity in z, aZ (m):	1.0
Time in days	Diffusion Coeff, D* (m^2/s):	1.0E-9
Distances in m	Hydraulic Cond, K (cm/s):	.1
Dispersivities in m	Hydraulic Grad, -dh/dx (m/m):	0.0020
Diff. and Disp. Coeff. in m^2/s	Total Porosity, n (%):	30.0
Hydraulic Conductivity in cm/s	Effective Porosity, ne (%):	25.0
Hydraulic Gradient in m/m (ft/ft)	Pore Water Velocity, V (m/s):	8.0E-6
Velocity in m/s	Dispersion Coeff in x, Dx (m^2/s):	8.000399999999999E-5
	Dispersion Coeff in y, Dy (m^2/s):	8.004E-6
	Dispersion Coeff in z, Dz (m^2/s):	8.004E-6
	Plume centerline, V*t (m):	691.1999999999999

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