FAX COVER SHEET

SECOR International Incorporated
360 Twenty-Second Street, Suite 600
Oakland, California 94612

Phone: 510-285-2556
Fax: 510-285-2568

Pages Transmitted (Including Cover Page): 3

To: Barney Chan Date: 8/14/00

Address:

Company: SECOR

Phone Number: 510-567-6765 Fax: (510) 337-9335

From:

Re:

Message: Barney - here are the calculations. I determined the median concentration for the site & used that number. I will over dose by ~150 x to account for soil oxidant demand (TOC, inorganics)

Thanx Anya -

Note: This message is intended only for the individual(s) to whom it is addressed and may contain privileged or confidential information. If you receive this communication in error, please notify the sender immediately by telephone and return the original by U.S. Mail to the address shown above. Thank you.

Hydrogen Peroxide Mass Estimation for Treatment of TPH at the Former Penske Facility, 725 Julie Ann Way, Oakland, California

The mass of hydrogen peroxide required to remediate the groundwater and aquifer sediments at the Former Penske Facility, 725 Julie Ann Way, Oakland, California (the site), was calculated using the following assumptions and conversions.

The dose required per injection point was calculated as follows:

Calculation of treatment zone volume:
Length (L) = 80 feet (ft), Width (W) = 80 ft, treatment depth interval or H (height) = 4ft

= L * W * H
= 25,600 cubic feet (ft^3)

Total volume = 25,600 ft^3

Total volume in liters (L) = 25,600 $ft^3 \times 7.48 \frac{gal}{ft^3} \times 3.785 \frac{L}{gal}$ = 724,782 L

Assuming a porosity of 30%, or 70% soil ($\frac{70\ parts\ soil}{100\ parts\ total}$):

Total soil volume = Volume $\times$ ($\frac{70\ parts\ soil}{100\ parts\ total}$)

= 724,782 L $\times$ ($\frac{70\ parts\ soil}{100\ parts\ total}$) = 507,347 L soil

Total Water Volume = 724,782 L $\times$ ($\frac{30\ parts\ soil}{100\ parts\ total}$) = 217,434 L water

Total mass of dry soil assuming a density of $\rho_s = 2.65 \frac{kg\ soil}{L\ soil}$:

= 507,347 L soil $\times$ 2.65 $\frac{kg\ soil}{L\ soil}$ = 1,344,470 kg soil

The median contaminant level in groundwater for the site was estimated to be 1.25 $\frac{mg\ TPH}{L}$. We assumed the value to be approximately 1.245 $\frac{mg\ TPH}{L}$ (in order to adequately estimate the amount of treatment required) and the concentration in soils was assumed to be 10 times that or 12.5 $\frac{mg\ TPH}{kg}$ (that is approximately the same as that

estimated by Regenesis in estimating hydrocarbon mass for their ORC calculations), therefore the total mass of TPH in groundwater and soil in the source area was estimated to be:

Groundwater TPH $= (1.25 \frac{\text{mg TPH}}{\text{L}}) \times \text{water volume (L)}$

$= 1.25 \frac{\text{mg TPH}}{\text{L}} \times 217{,}434\ \text{L} * \frac{1\text{g}}{1000\text{mg}} * \frac{1\text{kg}}{1000\text{g}} = 0.27\ \text{kg}$

Soil TPH mass $= 12.5 \frac{\text{mg TPH}}{\text{kg}} \times 1{,}344{,}470\ \text{kg} * \frac{1\text{g}}{1000\text{mg}} * \frac{1\text{kg}}{1000\text{g}} = 16.8\ \text{kg}$

(est)

Total Mass of TPH in pounds = $16.8\ \text{kg} * 2.2 \frac{\text{lb}}{\text{kg}} = 37.0\ \text{lb}$

Based on the estimated mass of TPH, the required mass of hydrogen peroxide for treatment was estimated to be approximately 150 times the hydrocarbon mass or: ?

Hydrogen peroxide required = mass of TPH * 150 = 37.0 lb *150 = 5,550 lb

Assuming a 50% peroxide solution for will be used for treatment, the total mass of solution required is estimated to be twice the calculated mass or 11,100 lb of 50% peroxide or:

50% H_2O_2

Volume of Hydrogen Peroxide $= 11{,}100\ \text{lb} * \frac{1\ \text{gal}}{9.98\ \text{lb}} = 1{,}112\ \text{gallons}$ of 50% H_2O_2 ✓

Therefore, SECOR will use 21 55-gallon drums of 50% hydrogen peroxide for the treatment. Assuming that approximately 100 injection points will be used, each injection point will receive 100 gallons of 5% hydrogen peroxide. All excess hydrogen peroxide will be injected into the tank cavity and in and around MW-1 and MW-7 to completely destroy all residual hydrocarbons.

21
55
105
105
1155 gal ✓

$21 \times 55\ \text{gal} \times .5 = 577.5$ gal H_2O_2 @ 50%

$100\ \text{inj} \times 100\ \text{gal} \times .05 = 500$ gal 5% H_2O_2

$577.5 - 500 = 77$ gal XS

11,550 gal @ 5%

$100 \times 10{,}000$

1550 gal 5% H_2O_2 XS.

1) Fe - buffering from soil
2) pH
3) TOC of soil - competitive vs. org. contaminant (Okay to 1.3%)