Letter Health Consultation

SHERWOOD MEDICAL INDUSTRIES

DELAND, VOLUSIA COUNTY, FLORIDA

EPA FACILIITY ID: FLD043861392

Prepared by the
Florida Department of Health

AUGUST 12, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

SHERWOOD MEDICAL INDUSTRIES

DELAND, VOLUSIA COUNTY, FLORIDA

EPA FACILITY ID: FLD043861392

Prepared By:

Florida Department of Health
Division of Public Health
Under Cooperative Agreement with
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Charlie Crist
Governor

Ana M. Viamonte Ros, M.D., M.P.H.
State Surgeon General

August 11, 2009

Chuck Luther
Environmental Health Director
Volusia County Health Department
121 Rich Avenue
DeLand, FL 32720

RE: Sherwood Medical NPL Site EPA ID: FLD043861392

Dear Mr. Luther:

The Florida Department of Health (DOH) evaluates the public health significance of Florida hazardous waste sites through a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia. In March 2007, Volusia County Health Department requested assistance in responding to local residents concerned about health risks from volatile organic compound (VOC) emissions from the groundwater treatment systems at the Sherwood Medical site.

Background and Statement of Issues

The Sherwood Medical facility, 3 miles northeast of DeLand (Attachment A), manufactures medical grade stainless steel and aluminum parts used in disposable hypodermic syringes. Between 1971 and 1980, Sherwood contaminated ground water with volatile organic compounds (VOCs), primarily tetrachloroethene (PCE), and trichloroethene (TCE). VOCs have migrated into several nearby private drinking water wells to the north, south and east of the facility (EPA 2004). In a previous report, DOH found levels of VOCs in active private drinking water wells were not likely to cause illness (ATSDR 2008).

The Environmental Protection Agency (EPA) approved two groundwater treatment systems. These systems are designed to prevent lateral migration of VOCs in the surficial aquifer and vertical migration into the Floridan aquifer (EPA 2004). Water from the Floridan aquifer air stripper is used in plant production. Water from the surficial aquifer treatment system discharges to the municipal waste water system. Each ground water treatment system vents VOCs directly to the atmosphere.

The inhalation exposure pathway for VOCs is complete. The source of the contamination is the groundwater treatment system air strippers that vent directly to the atmosphere. Although an exposure pathway is complete, estimated air concentrations are not likely to cause any cancer or non-cancer illness in nearby residents.

To determine whether Sherwood Medical air stripper emissions are adversely affecting the air quality of the surrounding neighborhoods, DOH estimated the air concentrations being released from both air strippers. Semi-annually, consultants for Sherwood verify the air stripper efficacy by analyzing influent (contaminated water flowing into the system) and effluent (treated water flowing out of the system) (Attachment B) (UES 2009). Treated effluent water from the air strippers must meet Florida drinking water standards.

To determine if air emissions pose a risk to human health, DOH estimated VOC concentrations vented from both air strippers and compared these levels to ATSDR health-based guidelines. To be protective of health, DOH assumed that the VOCs in the water were completely volatilized or transferred to the air during the air stripping process. DOH multiplied the average influent concentration in water by the maximum water influent rate. DOH then divided that concentration by the air flow rate to estimate the air concentration (Attachment D). To be protective of human health, DOH estimated a 10 fold dilution between the air stripper and the nearest residence 150 feet away. The actual dilution would likely be higher.

Tetrachloroethene (PCE)

For the surficial aquifer air stripper system, DOH estimates a maximum PCE concentration in air at the nearest residence of 9.2 micrograms per cubic meter ($\mu g/m^3$). This level is less than the ATSDR comparison value of 300 $\mu g/m^3$. ATSDR comparison values are conservative estimates of contaminant levels at which no health effects would be expected. For the Floridan aquifer air stripper system, DOH estimates a PCE concentration in air at the nearest residence of 0.06 $\mu g/m^3$. This is also less than the ATSDR comparison value. Therefore, concentrations of PCE in the air at the nearest residence from both ground water treatment systems would not be expected to cause any non-cancer illness.

For the surficial air stripper PCE air concentration (9.2 $\mu g/m^3$), the maximum estimated increased cancer risk is about 1 in 100,000 which is a very low theoretical increased risk. For the Floridan air stripper PCE air concentration (0.06 $\mu g/m^3$), the maximum estimated increased cancer risk is about 1 in 1,000,000 which is also a very low theoretical increased risk. DOH used a quantitative risk assessment method to calculate possible theoretical excess cancer risk for PCE. The risk is expressed as the increased risk of cancer over 20 years of exposure. DOH used an exposure duration of 20 years (the average length of time the air strippers have been on-line), a dilution factor of 10 between the air stripper and the nearest residence and an inhalation unit risk (IUR) factor for PCE of $4.15X10^{-5}$. This IUR is an extrapolation of California EPAs PCE inhalation cancer slope risk factor using a weighted average of breathing rates (Michael McCaskill, PhD, Florida Department of Health, personal communication, 2009). DOH used a number of health protective assumptions in deriving this risk estimate. The true risk is likely less and could be as low as zero.

Trichloroethene (TCE)

For the surficial aquifer air stripper system, DOH estimates a maximum TCE concentration in the air at

the nearest residence of 0.77 μg/m^3. This level is less than the ATSDR comparison value of 500μg/m^3. ATSDR comparison values are conservative estimates of contaminant levels at which no health effects would be expected. For the Floridan aquifer air stripper system, DOH estimates a maximum TCE concentration in the air at the nearest residence of 1.0 μg/m^3. This level is also less than the ATSDR air contaminant comparison value. Therefore, concentrations of TCE in the air from the ground water treatment systems would not be expected to cause any non-cancer illness.

For the surficial air stripper maximum TCE air concentration (0.77/ μg/L), the maximum estimated increased cancer risk is about 1 in 10,000,000 which is a very low theoretical increased risk. For the Floridan air stripper TCE air concentration (1.0 μg/L), the estimated maximum increased cancer risk is about 1 in 1,000,000 which is a very low theoretical increased risk. DOH used a quantitative risk assessment method to calculate possible theoretical excess cancer risk for TCE. The risk is expressed as the increased risk of cancer over 20 years exposure. DOH used an exposure duration of 20 years (the average length of time the air strippers have been on-line), a dilution factor of 10 between the air strippers and the nearest residence, and an inhalation unit risk (IUR) factor of $4.15X10^{-5}$. This IUR is an extrapolation of California EPAs TCE inhalation cancer slope risk factor using a weighted average of breathing rates (Michael McCaskill, PhD, Florida Department of Health, personal communication, 2009). DOH used a number of health protective assumptions in deriving this risk estimate. The true risk is likely less and could be as low as zero.

Conclusions

Breathing PCE and TCE from the air strippers at the Sherwood Medical site is not likely to harm people's health. These air strippers do not generate high enough concentrations of PCE and TCE to cause harm.

Recommendations

EPA and DEP should continue to verify the effectiveness of the air strippers semi-annually.

Sincerely,

Elizabeth Tull
Health Assessor
Florida Department of Health
Bureau of Environmental Public Health Medicine

cc: Erik Spalvins, Program Manager EPA Region IV
Chris Pelligrino, Program Manager FDEP

References

[ATSDR 2008] Agency for Toxic Substances and Disease Registry. 2008. Letter Health Consultation.

[ATSDR 1997a] Agency for Toxic Substances and Disease Registry. 1997. Toxicological Profile for Tetrachloroethylene. Update. Atlanta: U.S. Department of Health and Human Services.

[ATSDR 1997b] Agency for Toxic Substances and Disease Registry. 1997. Toxicological Profile for Trichloroethene. Update. Atlanta: U.S. Department of Health and Human Services.

[EPA 2004] Environmental Protection Agency. 2004. EPA Second Five Year Review for Sherwood Medical Industries NPL Site.

[UES 2009] Universal Engineering Sciences. July through December 2008 Semi-Annual Sampling Report. 2009.

CERTIFICATION

The Florida Department of Health, Division of Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began and completed editorial review.

Jennifer Freed
Technical Project Officer,
CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

Alan Yarbrough
Team Lead
CAT, CAPEB, DHAC, ATSDR

Attachment A
Location of Sherwood Medical Industries Site

FLORIDA DEPARTMENT OF HEALTH

Disclaimer: This product is for reference purposes only and is not to be construed as a legal document. Any reliance on the information contained herein is at the user's own risk. The Florida Department of Health and its agents assume no responsibility for any use of the information contained herein or any loss resulting there from.

DIVISION OF Environmental Health

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Attachment B: Surficial Aquifer Air Stripper System

Table 3. ANALYTICAL RESULTS - GROUNDWATER TREATMENT SYSTEM
SHERWOOD MEDICAL INDUSTRIES NPL SITE

Sample ID	Parameter	6/95	12/95	6/96	12/96	6/97	12/97	6/98	12/98	6/99	12/99	6/00	12/00	6/01	12/01	6/02
Air Stripper Influent	PCE	500	429	380	376	320	650	1,100	240	130	150	280	240	430	190	500
	TCE	27	<25	<25	<25	26	31	50	19	25	16	16	18	19	36	19
	Acetone	<1000	<1000	<1000	<1000	<24	<24	<25	<50	<500	<250	<250	<250	< 250	<250	<250
	cis 1,2-DCE	<25	<25	<25	<25	27	28	38	11	20	11I	8.0I	13	13	19	12
	trans 1,2-DCE	<25	<25	<25	<25	<12	<12	<1.0	1.1 I	<10	<5.0	<5.0	<5.0	< 5.0	<5.0	<5.0
	VC	<25	<25	<25	<25	<23	<23	<1.0	1.3 I	<10	<5.0	<5.0	<5.0	< 5.0	<5.0	<5.0
Air Stripper Effluent	PCE	0.69	4.69	<0.50	3.26	<1.9	<1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
	TCE	<0.50	<0.50	<0.50	<0.50	<3.0	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Acetone	<20	<20	<20	<20	<9.0	<9.0	<25	<50	<50	<50	<50	<50	<50	<50	<50
	cis 1,2-DCE	<0.50	0.62	<0.50	<0.50	<2.4	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	trans 1,2-DCE	<0.50	<0.50	<0.50	<0.50	<2.4	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	VC	<0.50	<0.50	<0.50	<0.50	<4.6	<4.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Sample ID	Parameter	12/02	6/03	12/03	6/04	12/04	6/05	12/05	6/06	12/06	6/07	12/07	6/08	12/08 (1)	12/08 (2)	12/08 (3)
Air Stripper Influent	PCE	200	250/200	220	200	180	34	280	199	110	65	200	100		160/160	
	TCE	14	39/37	25	18	15	26	24	25	40	18	17	21		25/24	
	Acetone	<250	<500/<500	<100	<50	<50	50	<50	<3	<2.6	<2.6	<0.74	NA	Not	NA	Not
	cis 1,2-DCE	<10	26/26	12	14	15	22	13	19	16	10	4.7	12	Sampled	11/11	Sampled
	trans 1,2-DCE	<10	<10/<10	<2.0	1.0	<1.0	<1	<1	<0.8	<0.83	<0.83	0.62 I	<0.43		<0.43/<0.43	
	VC	<10	<10/<10	<2.0	<2.0	<1.0	<1	<1	1	<0.52	<0.52	<0.91	<0.22		<0.22/<0.22	
Air Stripper Effluent	PCE	<3.0	13	<3.0	<3.0	<3.0	<3	4	<0.6	<0.65	<0.65	<0.47	<0.20	0.27 I	2.2/2.1	0.50 I
	TCE	<1.0	2.9	<1.0	<1.0	<1.0	<1	<1	<0.3	<0.71	<0.71	<0.30	<0.26	<0.26	0.60 I/0.56 I	0.27 I
	Acetone	<50	<50	<50	<50	<50	<50	<50	<3	<2.6	<2.6	<0.74	NA	<1.5	NA	NA
	cis 1,2-DCE	<1.0	3.4	<1.0	<1.0	<1.0	<1	<1	1	<0.75	<0.75	<0.34	<0.22	0.36 I	0.72 I/0.76 I	0.60 I
	trans 1,2-DCE	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.8	<0.83	<0.83	<0.58	<0.43	<0.43	<0.43/<0.43	<0.43
	VC	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.5	<0.52	<0.52	<0.91	<0.22	<0.22	<0.22/<0.22	<0.22

Note: All concentrations ug/l
"I" indicates estimated value
123/321 represents results of QA duplicate sample

12/08 (1) Collected 12/9/08
12/08 (2) Collected 12/22/08
12/08 (3) Collected 12/31/08

Source: UES, 2007

Attachment C: Floridan Aquifer Air stripper System (SMWS)

Table 2. ANALYTICAL RESULTS
SHERWOOD MEDICAL INDUSTRIES NPL SITE

(Page 9 of 11)
Lower Floridan Aquifer

Well ID	Parameter	12/97	6/98	12/98	6/99	12/99	6/00	12/00	6/01	12/01	6/02	12/02	6/03	12/03	6/04	12/04	6/05	12/05	6/06	12/06	6/07	12/07	6/08	12/08
MW-202	PCE	<1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3/<3	<0.6	<0.65	<0.65	<0.47	<0.20	<0.20
	TCE	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Not	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1/<1	<0.3	<0.71	<0.71	<0.30	<0.26	<0.26
	Acetone	<9.0	<25	<50	<50	<50	<50	<50	<50	Sampled	<50	<50	<50	<50	<50	<50	<50	<50/<50	<3	<2.6	<2.6	<0.74	NA	<1.5
	cis 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Pump	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1/<1	0.7 I	<0.75	<0.75	0.75 I	0.35 I	0.49 I
	trans 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	Out	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1/<1	<0.8	<0.83	<0.83	<0.58	<0.43	<0.43
	VC	<4.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1/<1	<0.5	<0.52	<0.52	<0.91	<0.22	<0.22
MW-203	PCE	<1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3	<0.6	<0.65	<0.65	<0.47	<0.20	<0.20
	TCE	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.3	<0.71	<0.71	<0.30	<0.26	<0.26
	Acetone	20	**71**	<50	<50	<50	<50	<50	81	<50	<50	<50	<50	<50	<50	<50	<50	<50	<3	<2.6	<2.6	<0.74	NA	<1.5
	cis 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	0.6 I	<0.75	<0.75	2	1.1	1.2
	trans 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.8	<0.83	<0.83	<0.58	<0.43	<0.43
	VC	<4.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.5	<0.52	<0.52	<0.91	<0.22	<0.22
MW-205	PCE	<1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3	<0.6	<0.65	<0.30	<0.47	<0.20	<0.20
	TCE	<3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.3	<0.71	<0.30	<0.30	<0.26	<0.26
	Acetone	25	35	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<3	<2.6	<2.0	<0.74	NA	<1.5
	cis 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.3	<0.75	<0.20	<0.34	<0.22	<0.22
	trans 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.8	<0.83	<0.20	<0.58	<0.43	<0.43
	VC	<4.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<0.5	<0.52	<0.40	<0.91	<0.22	<0.22
SMWS	PCE	<1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3	16	<0.6	<0.65	<0.65	<0.47	0.83 I	<0.20
	TCE	**91**	**74**	**65**	**69**	**60**	**55**	**53**	**57**	**46**	**32**	**25**	**29**	**16**	**13**	**18**	**23**	**19**	**13**	**16**	2.9	2.4	2.7	1.3
	Acetone	<9.0	<25	<50	<50	<50	<50	<50	< 50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<3	<2.6	<2.6	NA	NA	<1.5
	cis 1,2-DCE	46	39	33	49	52	51	57	**73**	**70**	**70**	51	**77**	60	55	68	66	68	61	55	66	**120**	62	66
	trans 1,2-DCE	2.4	1.7I	1.4I	1.9I	2.1I	<1.0	2.2	3.2	2.2	1.6	1.1	2.1	3.5	1.1	1.4	2	1	0.8 I	11	0.89 I	2.6	1.2	1.1
	VC	<4.6	**1.5 I**	**1.1I**	**1.5I**	**1.8I**	1.2I	**1.3**	**1.4**	**1.6**	<1.0	**1.0**	**1.6**	1.0	<1.0	<1.0	1	<1	1	**1.3**	**1.3**	**1.9**	**1.3**	0.68 I
SMFW	PCE	1.9	<2.0	<3.0	<3.0	<3.0	<3.0	<3.0		<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3		<0.6	<0.65		<0.47	<0.20	
	TCE	**8.9**	**13**	**10**	**9.6**	**7.5**	2.8I	1.1		<1.0	**1.1**	**2.2**	<1.0	2.1	<1.0	**4.4**	**6**		**20**	<0.71		<0.30	2.1	
	Acetone	<9.0	<25	<50	<50	<50	<50	<50		<50	<50	<50	<50	<50	<50	<50	<50		<3	<2.6		NA	NA	
	cis 1,2-DCE	5.9	8.1	5.8	14	8.1	8.4	3.3		1.0	2.0	3.3	4.3	5.1	1.2	9.4	14		25	7.7		<0.34	44	
	trans 1,2-DCE	<2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1		<0.8	<0.83		<0.58	<0.43	
	VC	<4.6	<1.0	<1.0	**1.4I**	**1.6I**	**7.0**	<1.0		<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0	**1.9**	**2**		1	**5.1**		<0.91	<0.22	
SMSR	PCE	**Supply well not in service until fall 2007**																				<0.47	<0.20	
	TCE																					<0.30	<0.26	
	Acetone																					NA	NA	
	cis 1,2-DCE																					<0.34	<0.22	
	trans 1,2-DCE																					<0.58	<0.43	
	VC																					<0.91	<0.22	

Well not available for sampling

Cleanup Criteria: PCE-3 µg/l, TCE-3 µg/l, Cis-1,2-DCE-70 µg/l,Trans-1,2-DCE - 100 µg/l, DCE Mixture - 83 µg/l, Acetone-700 µg/l, VC-1 µg/l, Chromium-100 µg/l. Results in bold exceed criteria.

Note: All concentrations ug/l
"I" indicates estimated value
123/321 represents results of QA duplicate sample

Source: UES, 2008

Attachment D:

Estimated Air Concentrations
Sherwood Medical NPL Site

VOC concentration in water X Maximum influent flow rate = Air emission concentration*
Maximum air flow rate

*DOH assumed that the VOCs in the water were completely volatilized or transferred to the air during the air stripping process.

Surficial Air Stripper System:

PCE:

PCE concentration in water = 289µg/L
Maximum influent flow rate = 220 gal/min
Maximum air flow rate =740SCF/min
Estimated PCE Concentration[1] = 9.2µg/ m^3

[1](289µg/L)(L/0.26417gal) = 1093.99µg/gal
(1093.99µg/gal)(220 gal/min) = 240678.3µg/min
(240678.3µg/min)(min/740SCF)= 325.24µg/SCF
(325.24µg/SCF)(SCF/35.3146667m3)= 9.2µg/m3

TCE:

TCE concentration in water = 50 µg/L
Maximum influent flow rate =220 gal/min
Maximum air flow rate: 740SCF/min
Estimated TCE Concentration[2] = 0.77 µg/ m^3

[2](24µg/L)(L/0.26417gal) = 90.85µg/gal
(189.27µg/gal)(220 gal/min) = 19987.1µg/min
(19987.1µg/min)(min/740SCF)= 27.0µg /SCF
(27µg/SCF)(SCF/35.3146667m3)= 0.77µg/m3

Floridan Aquifer Air Stripper:

PCE:

PCE concentration in water = 1.8µg/L
Maximum influent flow rate = 220 gal/min
Maximum air flow rate =740SCF/min
Estimated PCE Concentration[3] = 0.06µg/ m^3

[3](1.8µg/L)(L/0.26417gal) = 6.8µg/gal
(6.8µg/gal)(220 gal/min) = 1499µg/min
(1499µg/min)(min/740SCF)= 2µg/SCF
(2µg/SCF)(SCF/35.3146667m3)= 0.06µg/m3

TCE:

TCE concentration in water = 32µg/L
Maximum influent flow rate =220 gal/min
Maximum air flow rate: 740SCF/min
Estimated TCE Concentration[4] = 1.0µg/ m^3

[4](32µg/L)(L/0.26417gal) = 121.1µg/gal
(121.1µg/gal)(220 gal/min) = 26649.5µg/min
(26649.5µg/min)(min/740SCF)= 36.0µg /SCF
(36µg/SCF)(SCF/35.3146667m3)= 1.0µg/m3